# CUSTOM PUMPER

# BID PROPOSAL SPECIFICATIONS

# FOR

# KENT FIRE DEPARTMENT

# November 8, 2011

## PROPOSAL

KME Fire Apparatus is pleased to offer the proposed vehicle to meet the intent of the fire department specifications. KME Fire Apparatus is a leading manufacturer in custom and commercial fire fighting vehicles.

Questions or concerns pertaining to this proposal can be answered by contacting the following KME personnel:

KME Fire Apparatus
Albany Airport Industrial Park
68 Sicker Road
Latham NY 12110-1560

Contact: Tim Besser

Phone: (800) 394-5593 / (518) 785-0900
Cell: (570) 578-7950
Fax: (518) 785-1794

E-mail: kmeny@kovatch.com

## GENERAL INFORMATION

The proposed apparatus will be constructed to withstand the severe and continuous use encountered during emergency fire fighting services. The apparatus will be of the latest type, carefully designed and constructed with due consideration to the nature and distribution of the load to be sustained.

This proposal details the general design criteria of cab and chassis components, aerial device (if applicable), fire pump and related components (if applicable), water tank (if applicable), fire body, electrical components, painting, and equipment.

All items of these proposal specifications will conform to the National Fire Protection Association Pamphlet No. 1901, latest edition.

KME will furnish satisfactory evidence of our ability to construct, supply service parts and technical assistance for the apparatus specified.

## FIRE APPARATUS DOCUMENTATION

KME will supply, at the time of delivery, at least one (1) copy of the following documents:

The manufacturer's record of apparatus construction details, including the following information:

- Owners name and address
- Apparatus manufacturer, model and serial number
- Chassis make, model and serial number
- Front tire size and total rated capacity in pounds
- Rear tire size and total rated capacity in pounds
- Chassis weight distribution in pounds with water and manufacturer mounted equipment, front and rear
- Engine make, model, serial number, rated horsepower, rated speed and governed speed
- Type of fuels and fuel tank capacity

- Electrical system voltage and alternator output in amps.
- Battery make, model and total capacity in cold crank amps (CCA)
- Transmission make, model and serial number. If so equipped chassis transmission PTO(s) make, model and gear ratio
- Pump make, model, rated capacity in gallons per minute (liters per minute where applicable) and serial number
- Pump transmission make, model, serial number and gear ratio
- Auxiliary pump make, model, rated capacity in gallons per minute (liters per minute where applicable) and serial number
- Water tank certified capacity in gallons or liters
- Paint manufacturer and paint number(s)
- Certification of slip resistance of all stepping, standing and walking surfaces.

If the apparatus has a fire pump or an industrial supply pump, the pump manufacturer's certification of suction capability.

If the apparatus has a fire pump or an industrial supply pump, a copy of the apparatus manufacturer's approval for stationary pumping applications.

If the apparatus has a fire pump or an industrial supply pump, the engine manufacturers certified brake horsepower curve for the engine furnished, showing the maximum governed speed.

If the apparatus has a fire pump or an industrial supply pump, the pump manufacturers certification of hydrostatic test.

If the apparatus has a fire pump or an industrial supply pump, the Underwriters Laboratory certification of inspection and test for the fire pump.

If the apparatus has an aerial device the Underwriters Laboratory certification of inspection and test for the aerial device.

If the apparatus has an aerial device, all the technical information required for inspections to comply with NFPA 1911, Standards for Testing Fire Department Aerial Devices.

If the apparatus has a fixed line voltage power source, the certification of the test for the fixed power source.

If the apparatus is equipped with an air system, test results of the air quality, the SCBA fill station, and the air system installation.

Weight documents from certified scale - showing actual loading on the front axle, rear axle(s) and overall vehicle (with the water tank full but without personnel, equipment and hose) will be supplied with the complete vehicle to determine compliance with NFPA-1901

Written load analysis and results of electrical performance tests.

If the apparatus is equipped with a water tank, the certification of water tank capacity by the tank manufacturer.

The proposed chassis will be certified by the apparatus manufacturer as conforming to all applicable Federal Motor Vehicle Safety Standards (FMVSS) in effect at the date of contract. This will be attested to by the attachment of a FMVSS certify caution label on the vehicle by KME, who will be recognized as the responsible final manufacturer.

KME will be responsible for preparing and maintaining a record file of parts and assemblies used to manufacture the proposed apparatus. These records will be maintained in KME's factory for a minimum of twenty (20) years. The file will contain copies of any and all reported deficiencies, all replacement parts required to maintain the apparatus, and original purchase documents including specifications, contract, invoices, incomplete chassis certificates, quality control reports and final delivery acceptance documents. The purchaser will have access to any and all documents contained in this file upon official written request.

**GENERAL CONSTRUCTION**

The proposed apparatus, assemblies, subassemblies, component parts, etc., will be designed and constructed with the due consideration to the nature and distribution of the load to be sustained and to the general character of the service to which the apparatus is subjected to when placed in service. All parts of the apparatus will be designed with a factor of safety, which is equal to or greater than that which is considered standard and acceptable for this class of equipment in fire fighting service. All parts of the proposed apparatus will be strong enough to withstand general service under full load. The apparatus will be so designed that the various parts and readily accessible for lubrication, inspection, adjustment and repair.

The apparatus will be designed and constructed, and the equipment so mounted, with due consideration to distribution of the load between front and rear axles that all specified equipment, including a full complement of specified ground ladders, full water tank, loose equipment, and firefighters will be carried without overloading or injuring the apparatus.

**SINGLE-LINE RESPONSIBILITY**

KME is a true "sole source" manufacturer. KME engineers, designs, manufactures, builds and paints our own fire apparatus cab, chassis, body, aerial devices and electrical systems. All work is done in KME owned and operated manufacturing facilities by KME direct employees. This capability provides consistent design and manufacturing procedures that will reduce warranty issues and provide ease in parts replacement.

**PRODUCT LIABILITY INSURANCE**

KME provides liability and facility insurance equaling $30,000,000.00, which is one of the highest available in the fire industry. Reference attached documentation.

**SERVICE CENTER AND PARTS DEPOT**

KME Fire Apparatus
Factory Branch - NY

## KME FIRE APPARATUS SERVICE STATEMENT

The proposed KME Fire Apparatus vehicle is offered with service for in or out of warranty repairs can be promptly performed by the local KME authorized service center.

**Service is provided by:**

KME Fire Apparatus
New York Factory Branch
68 Sicker Road
Latham, NY 12110
Phone: (800) 394-5593/(518) 785-0900
Cell: (518) 378-3933 John Cameron
Fax: (518) 785-1794

**Service Center Capabilities**

**KME New York Factory Branch** celebrates its 8th year of operation and employs fifteen (15) people and is proud to operate a Service Center in Latham, NY. The factory owned operation employs eight (8) full-time service mechanics to handle any service-related problems or improvements that you may desire.

**KME New York Factory Branch** is a Hale Master Parts and Service Center that operates three (3) on the road service trucks that can offer In Station Service repairs to your apparatus if needed.

**KME New York Factory Branch** offers twenty-four (24) hour service in which assigned service personnel carry pagers; one (1) man is always on call to handle any truck that is down and out of service.

The service facilities provide service to handle sheet metal repair and fabrication, pump and electrical repair, aerial ladder service, and repair booster tank enlarging and replacement, and minor or major refurbishment capabilities.

Service and repairs to all makes of fire apparatus including trucks with Hale, Waterous, Darley, FMC and John Bean Pumps.

**KME New York Factory Branch** Service Center employees are fully insured with 1 Million Workman's Compensation, 1 Million Dollar Garage Keepers Liability Insurance Coverage and a 25 Million Dollar Products Liability Insurance Policy to protect your fire department in case of injury to personnel or your fire department equipment.

## PRICES AND PAYMENTS

The bid price will be F.O.B. Destination, on a delivered and accepted basis at the Fire Department.

Total price on KME's proposal sheet will include all items listed in these specifications.

KME has computed pricing less federal and state taxes. It is understood that any applicable taxes will be added to the proposed prices, unless the purchaser furnishes appropriate tax-exempt forms.

**DELIVERY TIME**

KME is proposing to complete the apparatus delivery time based on the number of calendar days, starting from the date the sales contract is signed and accepted by KME Fire Apparatus.

Delivery Time: 210-240 Calendar Days

**PERFORMANCE BOND**

A performance bond will be supplied by the KME upon acceptance of the signed sales contract for the apparatus. The performance bond will be for an amount equal to the full contract price (i.e. 100% bond).

**MATERIAL AND WORKMANSHIP**

All equipment furnished will be guaranteed to be new and of current manufacture, to meet all requirements of purchaser's specifications.

All workmanship will be of high quality and accomplished in a professional manner so as to insure a functional apparatus with a pleasing, aesthetic appearance.

**SALES ENGINEER**

KME will designate an in house individual to perform KME's sales engineer functions. The sales engineer will provide a single point interface between the purchaser and KME on all matters concerning the contract.

**APPROVAL DRAWING**

A detailed drawing of the apparatus will be provided to the Kent Fire Department for approval before construction begins. A copy of this drawing will also be provided to the manufacturer's representative. Upon Kent Fire Department approval, the finalized drawing will become a part of the total contract.

The drawing will show, but is not limited to, such items as the chassis make and model, major components, location of lights, sirens, all compartment locations and dimensions, special suctions, discharges, etc. The drawing will be a visual interpretation of the apparatus as it is to be supplied.

**INSPECTION VISITS**

KME will provide three (3) factory inspection trips to KME's facility. Transportation, meals, lodging, and other requisite expenses will be the bidder's responsibility.

Accommodations will be for five (5) Fire Department representatives per trip.

The factory visits will occur at the following stages of production of the apparatus:

- Pre-construction / blueprint review.
- Midpoint completion of entire apparatus.
- Final inspection upon completion.

Travel arrangements less than 300 miles from the manufacturing facility will be via ground transportation.

The customer maintains the right to inspect the apparatus, within KME's normal business hours. At any other point during construction expenses incurred during non-specified visits will be the responsibility of the customer.

During inspection visits, the customer reserves the right to conduct actual performance tests to evaluate completed portions of the unit. Testing will be accomplished with the assistance and resources of the contractor.

**DELIVERY**

Delivery of the apparatus to the Fire Department will remain KME's responsibility.

A qualified and responsible representative of KME will deliver the apparatus to the Fire Department.

**INSTRUCTION MANUALS/DRAWINGS, SCHEMATIC**

KME will supply at time of delivery, two (2) copies of a complete operation and service manual covering the complete apparatus as delivered and accepted.

The manual will contain the following:

- Descriptions, specifications, and ratings of chassis, pump (if applicable), and aerial device.
- Wiring diagrams.
- Lubrication charts.
- Operating instructions for the chassis, any major components such as a pump and any auxiliary systems.
- Instructions regarding the frequency and procedures recommended for maintenance.
- Parts replacement information.

**"AS BUILT" WIRING SCHEMATICS**

In accordance with standard commercial practices, KME will supply two (2) copies of "AS BUILT" wiring schematics/diagrams for the entire vehicle at the time of delivery.

**PRINCIPAL APPARATUS DIMENSIONS & G.V.W.R.**

The principal dimensions of the completed apparatus will not exceed the following maximum acceptable dimensions:

**KME PROPOSED DIMENSIONS:**

- OVERALL LENGTH: 381"
- OVERALL WIDTH: 100"
- OVERALL HEIGHT: 114"
- WHEELBASE: 188"

The axle and total weight ratings of the completed apparatus will not be less than the following minimum acceptable weight ratings:

- MINIMUM FRONT G.A.W.R.: 20,000 lbs.
- MINIMUM REAR G.A.W.R.: 27,000 lbs.
- MINIMUM TOTAL G.V.W.R.: 47,000 lbs.

KME will include the principal dimensions, front G.A.W.R., rear G.A.W.R., and total G.V.W.R. of the proposed apparatus. Additionally, KME will provide a weight distribution of the fully loaded, completed vehicle; this will include a filled water tank, specified hose load, miscellaneous equipment allowance in accordance with NFPA-1901 requirements, and an equivalent personnel load of 250 lbs. per seating position.

**KME OWNERSHIP**

KME is a tightly held family owned corporation. All of the stockholders are members of the Kovatch family of Nesquehoning, PA. KME carries no (zero) long term debt and is the largest privately owned manufacturer of fire apparatus in the country.

**PRIMARY PLANT CONSTRUCTION**

In order to insure top quality construction, maximum assembly line and engineering communication and the highest level of manufacturing supervision the entire apparatus will be built at the bidders' primary (headquarters) manufacturing facility. Apparatus constructed at satellite plants will not be considered.

**PROPOSAL BLUEPRINT**

KME is providing a scaled drawing of the specific apparatus being proposed WITH THE BID. The drawing has been generated by KME's engineering department in order to maintain the accuracy of the drawing.

**FAMA MEMBERSHIP**

KME Fire Apparatus is a leading and proud member of the Fire Apparatus Manufacturer's Association (FAMA).

**U.S.A. MANUFACTURER**

The entire apparatus will be assembled within the borders of the Continental United States to insure more readily available parts (without added costs and delays caused by tariffs and customs) and service.

**UNDERWRITERS LABORATORIES INC. (UL) EXAMINATION AND TEST PROPOSAL**

If required by the specific chapters of NFPA-1901, the proposed unit will be tested and certified for KME Fire Apparatus by Underwriters Laboratories Inc. (UL) Underwriters Laboratories Inc. (UL) is recognized worldwide as a leading third party product safety certification organization for over 100 years. UL has served on National Fire Protection Association (NFPA) technical committees for over thirty years.

**INDEPENDENT TESTING ORGANIZATION QUALIFICATIONS**

- UL is a nationally recognized testing laboratory recognized by OSHA.
- UL complies with the American Society for Testing and Materials (ASTM) Standard ASTM E543 "Determining the Qualifications for Nondestructive Testing Agencies."
- UL has more than 40 years of automotive fire apparatus safety testing experience and 16 years of factory aerial device testing and Certification experience. UL has more than 100 years of experience developing and implementing product safety standards.
- UL does not represent, is not associated with, nor is in the manufacture or repair of automotive fire apparatus.
- All test work for fire pumps outlined in NFPA 1901, Edition will be conducted.
- UL has included a list of all factory aerial device manufacturers for whom testing is currently being conducted on a regular basis.
- UL carries ten million dollars in excess liability insurance for bodily injury and properly damage combined.

All work outlined in NFPA 1914, current Edition, including nondestructive testing, will be conducted at the manufacturer's facility.

**PERSONNEL**

The UL inspectors performing the test work on the units are certified to Level II in the required NDT methods, under the requirements outlined in ASNT document CP-189.

The actual person(s) performing the inspection will present for review proof of Level II Certification in the required NDT methods.

Prior to submittal to the automotive fire apparatus manufacturer, the final Report will be reviewed by the Supervisor of Fire Equipment Services and a Registered Professional Engineer, both of whom are directly involved with the aerial device certification program at UL.

**GENERAL APPARATUS DESCRIPTION "PUMPER"**

The unit will be designed to conform fully to the "Pumper Fire Apparatus" requirements as stated in the NFPA 1901 Standard (2009 Revision), which will include the following required chapters as stated in this revision:

- Chapter 1 Administration
- Chapter 2 Referenced Publications
- Chapter 3 Definitions
- Chapter 4 General Requirements
- Chapter 5 Pumper Fire Apparatus
- Chapter 12 Chassis and Vehicle Components
- Chapter 13 Low Voltage Electrical Systems and Warning Devices
- Chapter 14 Driving and Crew Areas
- Chapter 15 Body, Compartments and Equipment Mounting
- Chapter 16 Fire Pumps and Associated Equipment
- Chapter 18 Water Tanks
- Chapter 20 Foam Proportioning Systems
- Chapter 22 Line Voltage Electrical Systems

## CAB SAFETY SIGNS

The following safety signs will be provided in the cab:

- A label displaying the maximum number of personnel the vehicle is designed to carry will be visible to the driver.
- "Occupants will be seated and belted when apparatus is in motion" signs will be visible from each seat.
- "Do Not Move Apparatus When Light Is On" sign adjacent to the warning light indicating a hazard if the apparatus is moved (as described in subsequent section).
- A label displaying the height, length, and GVWR of the vehicle will be visible to driver.
- This label will indicate that the fire department will revise the dimension if vehicle height changes while vehicle is in service.

## CHASSIS DATA LABELS

The following information will be on labels affixed to the vehicle:

Fluid Data

- Engine Oil
- Engine Coolant
- Chassis Transmission Fluid
- Pump Transmission Lubrication Fluid
- Pump Primer Fluid (if applicable)
- Drive Axle(s) Lubrication Fluid
- Air Conditioning Refrigerant
- Air Conditioning Lubrication Oil
- Power Steering Fluid
- Cab Tilt Mechanism Fluid
- Transfer Case Fluid (if applicable)
- Equipment Rack Fluid (if applicable)
- Air Compressor System Lubricant
- Generator System Lubricant (if applicable)
- Front Tire Cold Pressure
- Rear Tire Cold Pressure
- Aerial Hydraulic Fluid (if applicable)
- Maximum Tire Speed Rating

Chassis Data

- Chassis Manufacturer
- Production Number
- Year Built
- Month Manufactured
- Vehicle Identification Number

Manufacturers weight certification:

- Gross Vehicle (or Combination) Weight Rating (GVWR or GCWR)
- Gross Axle Weight Rating, Front
- Gross Axle Weight Rating, Rear

**ROLLOVER STABILITY**

The apparatus will meet the criteria defined in 4.13.1 for rollover stability as defined in the 2009 NFPA Standard for Automotive Fire Apparatus.

****** CAB AND CHASSIS ******

**"PREDATOR PANTHER" CAB TYPE**

- **FULL TILT**
- **CONTOUR WINDSHIELD**

The cab will be a custom tilt style, built specifically for fire service. The cab will be a cab over engine design, with integral tilt mechanism and engine access from inside the cab.

Cab will be designed, fabricated, assembled in its entirety, and installed on the frame rails in the manufacturer's factory. This requirement will eliminate any split responsibility in warranty and service.

**OPEN SPACE DESIGN**

The cab interior will be the "Open-Space" design with no wall, window or vertical support posts between the front and rear crew areas to allow direct communication, better visibility and air circulation in the cab.

**CAB MATERIAL**

The cab will be fabricated from 5052-H 32 aluminum alloy, utilizing the minimum material thickness as follows:

- Cab side panels 0.125 thick (1/8")
- Cab roof 0.125 thick (1/8")
- Forward cab front sheet 0.125 thick (1/8")
- Interior cab panels 0.125 thick (1/8")
- Other panels 0.125 thick (1/8")
- Cab doors 0.1875 thick (3/16")
- Engine enclosure side panels 0.250 thick (1/4")

**CAB - BASE CONSTRUCTION**

Cab sub-frame will be a welded assembly fabricated of 6063 structural aluminum alloy. This frame will extend the full length and width of the cab and be secured to the chassis frame through two (2) rear urethane self centering load cushions, two (2) forward pivot brackets, and two (2) cab locks. The cab will be of entirely welded construction.

The front cab wall will be of double wall type construction, featuring an inner and outer panel.

**CRASH TESTING CERTIFICATION**

To ensure the safety of the cab occupants and cab integrity, proof of third party testing will be provided. The cab will be certified for SAEJ2422 side impact, SAEJ2420 with ECER29 cab front impact, and ECER29 cab roof strength.

Furthermore, proof of testing and certification will be provided that the cab, in accordance to SAE J2420 was front impact tested at 2.1 times the standard energy required in SAE J2420, thus exceeding the NFPA requirement.

This test will be performed with no support immediately behind the cab, thus providing an authentic test result.

**ROOF AND SIDE LOAD TESTING**

The cab design will include additional third party testing to ensure the safety of the cab occupants and cab integrity, proof of third party testing will be provided. The cab will be certified for SAEJ2422 side impact, SAEJ2420 with ECER29 cab front impact, and ECER29 cab roof strength.

The manufacturer will provide proof that third party testing has been conducted to prove a static roof and a static side-load test has been completed. In these tests, a 120,000 pound static load was first applied to the roof. This test was followed by applying the same 120,000 pound static load to the side of the cab.

These tests will be conducted per the SAE J2422, Cab Roof Strength Evaluation, protocol and the ECE R29, Uniform provisions concerning the approval of vehicles with regard to the protection of occupants of the cab of a commercial vehicle, protocol.

During both tests, the cab will withstand these loads without encroachment into the occupant survivable space and all doors remained closed during the test. The tests will be documented with photographs and real-time video in a report provided to the manufacturer.

**DIMENSIONS - MEDIUM FOUR DOOR STYLE CAB**

Minimum Cab Dimensions:

- Overall width 100"
- Inside width across ceiling 92"
- Front area floor to ceiling 63"
- Top of front seat to ceiling 44" (depending upon seat type)
- Seat back to steering wheel 22" (depending upon seat type)
- Inside width (door to engine enclosure) 25" (driver's side, at floor)
- Inside width (door to engine enclosure) 22-1/2" (officer's side, at floor)
- Crew seat area width 92"
- Outer crew seat risers to rear wall 42"
- Centerline front axle to back of cab 62-1/2"
- Floor to top of engine enclosure 29 1/2”
- Centerline axle to front of cab 74”

Glass Area Dimensions:

- Windshield (Contour) 3,422 sq. in.
- Front door window, retractable 743 sq. in. each
- Rear door window, retractable 875 sq. in. each
- Fixed side windows 620 sq. in. each

Cab Entry Door Width Dimensions

- Forward door opening 43" wide
- Rear door opening 40" wide

Cab Entry Step Dimensions

- Forward door recessed step 32" wide x 9" deep
- Rear door recessed step 32" wide x 9" deep

Cab Entry Door Height Dimensions

- Forward door opening 76-1/4" high
- Rear door opening 85-1/4" high

**CAB ROOF**

The roof will be of a split level design with radius edges for an aesthetic, streamline appearance. The roof will be constructed the same material as the main structure and will be internally reinforced using framing which will span the entire width and length of the cab for maximum structural integrity. This will allow the roof to support personnel and roof mounted equipment without the need for additional reinforcement.

The cab roof over the rear crew area will be raised ten (10) inches higher than the front driver and officer area. The front face of the raised roof section will be sloped at a 45 degree angle, creating a streamlined interface with the standard, lower, forward roof section. This design will allow for additional interior height in the rear crew area.

The rear crew area doors will be "Vista-Style", extending full height to the radius edge of the raised roof.

Approximate dimensions:

- Crew area floor to ceiling 64"
- Top of crew seat to ceiling 46" (depending upon seat type)

**CAB DOORS**

Four (4) side-opening doors will be provided. The cab doors will be totally aluminum construction with an extruded aluminum frame and a 3/16" thick aluminum outer door skin. Doors will be full height from the step to the cab roof extrusion and enclose the step area when the doors are closed.

The forward cab door opening will be a minimum of 40" wide, and the rear cab door opening will be a minimum of 37" wide. The rearward cab doors will have a radius cutout allowing the door opening to protrude forward over the cab wheel well, while providing full access to the rear crew area.

There will be a heavy duty piano type stainless steel hinge on each door with a minimum pin diameter of 5/16". Hinges will be slotted for ease of horizontal and vertical adjustment. There will be a cab door seal and the doors will close flush with the side of the cab. . A heavy-duty 2 1/2" wide reinforced rubber strap will be utilized to prevent the cab doors from opening greater than 90 degrees.

**ENTRY STEP AREA**

Each of the forward entrance steps will be a minimum of 8-1/2" deep with the floor board recessed a minimum of 5" to avoid "shin knocking". Each step will be a bolt-in cast aluminum step. The cab steps risers will be overlaid with bright finish aluminum tread plate.

Each of the rear entrance steps will be a minimum of 8-1/2" deep. An intermediate step will be provided between the lower entrance step and the crew area floor for ease of entry and egress. Each step will be fabricated as an integral part of the cab construction. The cab step risers will be smooth material, painted to match the cab exterior color.

Each lower step be a bolt-in cast aluminum step.

**DOOR LATCHES**

A semi-recessed chrome plated pull handle, capable of operating with a gloved hand, will be provided on the exterior of each cab door. Heavy-duty, bright finish cast paddle latches will be provided on the interior of each cab door. Door latch mechanisms which utilize spring steel clamps will not be considered due to their tendency to both rust and break. The interior door latch cables are to be designed to reduce adjustment or possible wear at the adjustment turnbuckles.

Each exterior cab door will be equipped with keyed locks. The cab doors will be capable of being locked from the outside with a key and from the inside with a control in each interior paddle latch.

**ELECTRIC WINDOWS**

Each side cab door will have a tinted retractable window. The window track will be designed into the door frame extrusion, which will be extruded with a track groove to house a window track and seal. The window will be capable of being removed from an access slot designed in the bottom of the door frame.

All side cab doors will be equipped with electrically operated windows.

The driver will have a control to operate the officer’s side window and the rear cab windows, in a panel located on the dash. The officer side window control will be in a panel on the dash.

The control for each rear door will be a rocker type automotive style switch located on the inside door panel within easy reach.

Each side cab door window will be designed with a custom extruded trim plate, which will conform to the perimeter of the window opening in each door. The trim plate will extend from the edge of the door skin to the window and will have a silver anodized finish.

**INNER DOOR PANELS**

The cab door interior panels will be covered with an aluminum panel, full height. The panel will be 1/8" aluminum painted with Zolatone textured paint and will be designed to allow easy access to the inner door.

Each interior cab door panel will be equipped with reflective ScotchLite material that will cover at least 96 $in^2$.

**WINDSHIELD/GLASS**

A two piece, symmetrical, safety glass windshield will be provided on the cab for the driver and officer providing a clear viewing area. The windshields will be full width to the center of the front cab support for each side and provide the occupants with a panoramic view. To provide enhanced peripheral vision on each side of the cab, the windshield and cab structure will be designed with radius corners, which provide a minimum of 8" of glass area, measured from the glass face to the side edge near the door post. The windshield will consist of three (3) layers; the outer light, the middle safety laminate and the inner light. The thick outer light layer will provide superior chip resistance, the middle safety laminate layer will prevent the windshield glass pieces from detaching in the event of breakage and the inner light will provide yet another chip resistant layer.

The windshield will be a contour design with 3422 sq. in. of area for improved visibility and style. The windshield glass will be designed so it can be used on either the driver or officer side. Single piece windshields that utilize epoxy or that are bonded to the cab structure will not be acceptable.

**WINDSHIELD WIPERS AND WASHER**

Dual, electric operated, pantographic type windshield wipers will be provided. One (1) electric drive motor will be provided for each wiper.

Wipers will have "HI/LO" and "INTERMITTENT" operating speeds. "HI/LO" speeds will be controlled by a steering column control, within the turn signal control stem. "INTERMITTENT" operation will be controlled by a twist switch within the control on the steering column. The wipers will be of the self-parking type.

Windshield washers will be electric operated wet-arm type with a 3/4 gallon washer fluid reservoir, mounted inside the engine enclosure and readily accessible through the engine hatch at the rear of the engine enclosure. The washer control will be integral with the intermittent wiper control switch.

There will be individual removable panels on the front face of the cab for access to the wiper motor assemblies.

**WINDSHIELD WIPER DURABILITY CERTIFICATION**

Windshield wipers shall survive testing in excess of 3 million cycles in accordance with section 6.2 of SAE J198 “Windshield Wiper Systems – Trucks, Buses and Multipurpose Vehicles”. The bidder shall certify that the wiper system design has been “Third party tested” and that the wiper system has met this criteria.

**CAB SIDE VIEWING WINDOWS**

A fixed, tinted window with 620 sq. in of glass area will be provided on each side of the cab behind the forward cab doors. This window will be the same height as the window in the rear cab door for maximum visibility.

**DOT TINT WINDOW GLASS**

The windshield, all door glass and any viewing window will be provided with standard DOT green automotive tint.

**GRAB HANDLES**

Four (4) 1-1/4" diameter x 28" long, knurled, bright anodized aluminum handrails will be provided, one (1) at each cab door entrance. Grab rail stanchions will be chrome plated and offset when necessary to prevent "hand-pinching" when opening or closing the doors. Formed rubber gaskets will be provided between each stanchion base and the cab surface.

**INTERIOR GRAB RAILS**

Each front cab door will be provided with one (1) horizontally mounted, 11" long, black cast "D" style aluminum handle in the upper center rear portion of the door panel for use in closing the door.

Each rear cab door will be provided with one (1) horizontally mounted, 11" long, black cast "D" style aluminum handle in the upper center rear portion of the door panel for use in closing the door.

Each rear cab door will also be provided with one (1) horizontally mounted, 30" long black cast aluminum "D" style assist handle, located approximately 8" above the bottom of the window opening.

**FRONT CAB GRILL**

There will be a bright finished, custom formed grille assembly for maximum air flow to the charge air cooler and the radiator. The grille will be designed with an aesthetic look, with large horizontal louvers that will be reinforced to provide integrity. The grill design will match the thickness of the headlights to provide a streamlined, cohesive front trim package.

**AIR INTAKE/OUTLET**

Two (2) bright finished, custom formed air inlets/outlets will be provided horizontally above the wheel well opening, one on each side of the cab. The grille will be designed with an aesthetic look with horizontal louvers that will be equipped with a painted steel screen to serve as a secondary ember separator. The side intakes will be bolstered a minimum of 1” from the skin of the cab face. The design will permit proper ducting of air through the engine compartment and cooling system.

**ENGINE AIR INTAKE SYSTEM**

The left side inlet, used for the air intake to the air cleaner, will be equipped with dual ember separators for separating burning embers from the air intake system. This system will be such that particles larger than .039 inches (1 mm) in diameter cannot reach the air filter element.

No part of the air intake system for the engine will be lower than the top of the frame rails to ensure the vehicle can navigate pooled water without any part of the air intake system being exposed to water when the vehicle is stopped or in motion. Chassis designs, which the engine air intake system is lower than the frame rails will not be acceptable!

**WHEEL WELL LINERS**

The front cab wheel wells will be equipped with fully removable, bolt-in, aluminum inner wheel well liners. The liners will extend full depth into the truck frame. The completely washable wheel well liners will be designed to protect the cab substructure, inner panels, and other miscellaneous installed components from road salts, debris, dirt accumulation and corrosion.

**FENDERETTES**

The cab wheel well openings will be trimmed with replaceable, bolt-in, polished aluminum fenderettes. The fenderettes will be secured to the cab with stainless steel threaded fasteners along the internal perimeter of the wheel well. Rubber welting will be installed between the fenderettes and the cab side panel.

**FRONT MUD FLAPS**

Heavy duty, black rubber type mud flaps will be provided behind the front wheels.

**VELVAC WEST COAST MIRRORS WITH 2010 HEADS and 6" CONVEX**

Two (2) Velvac West Coast style 2010 mirrors will be furnished, one 708211-4 and one 708212-4 on each front cab door. Each mirror will have a 16 x 8 flat glass head mounted in a polished 300 series stainless steel outer shell and a heavy duty ABS inner housing. Both heads will be electrically heated, controlled by one (1) switch on the dash convenient to the driver. Both mirror heads will be controlled from the driver's seating position by one (1) four way switch that allows the driver to select either the officer side mirror or the driver side mirror. The mirror heads will be installed on a one piece stainless steel loop mounted to the forward portion of the door with two (2) brackets, forward of the windows.

Two (2) 6" diameter stainless steel convex mirrors will also be furnished, one on each lower loop of the mounting bracket.

**INTERIOR TRIM**

The headliners will be upholstered with gray Durawear material. The cab interior will be constructed to create an ergonomically designed interior to be user friendly and functional for the driver and officer. The cab dash will be a custom formed ABS plastic module.

The forward overhead panel will be a fabricated aluminum module painted to match the interior. This module will contain the integrated windshield defroster/heater.

All of the interior upholstery panels will be gray in color. The upholstered cab overhead and side wall portions will utilize gray Durawear upholstery with padding underneath to provide additional insulation.

The interior metal surfaces of the cab will be finish painted with Zolatone #20-64 grey stone paint.

**INTERIOR REAR WALL**

The interior rear wall of the cab will be covered with gray Durawear for durability and will match the other upholstered areas of the cab.

**BARYFOL FLOORING**

The floor of the driver's compartment and the floor of the crew area will be lined with BARYFOL vinyl composite flooring to comply with NFPA noise and heat requirements.

The material utilized for this application will be certified to meet the NFPA 1901, 2009 revision for anti slip walking surfaces.

**ENGINE ENCLOSURE**

The forward portion of the engine enclosure will be covered with a three (3) piece ABS plastic module. To allow maximum "elbow room" for the driver and officer, the forward portion of the engine enclosure will feature a contour shape. The engine enclosure will not significantly obstruct the driver's vision in any direction. The enclosure will be an integral part of the cab structure, which will be constructed from .250 5052-H32 aluminum, providing adequate strength to support radio, map boxes, etc. The engine enclosure will be insulated to protect from heat and sound. The noise insulation will keep the DBA level within the limits stated in the current NFPA series 1900 pamphlet.

A hinged access door will be provided in the top rearward portion of the engine enclosure. The door will allow access to the engine oil, transmission fluid, power steering fluid level dipsticks and the windshield washer fluid reservoir. The access door will be provided with two (2) flush mounted latches and gas shock holders. There will be an ABS plastic cover over the access door to give a cleaner look to the top of the engine enclosure and doghouse area.

The rear section of the engine enclosure will be reduced 8-1/2" in length to provide additional leg room for the forward facing seating position/s.

**SUN VISORS**

To provide maximum protection for the driver and officer, two (2) dark polycarbonate sun visors will be mounted in the cab overhead on each side.

******* CAB SEATING & ACCESSORIES *******

**SEAT BELT ANCHOR TESTING**

Each seat belt anchor will be tested to withstand 3,000lbs of pull on both the lap and shoulder belt in accordance with FMVSS 210 section 4.2.

**SEAT MOUNTING TESTING**

Each seat mounting position will be tested to withstand 20G's of force in accordance with FMVSS 207 section 4.2(c).

Both tests will be performed and verified at a third party testing and evaluation center.

**DRIVERS SEAT, BOSTROM SIERRA AIR SUSPENSION, ABTS**

The driver's seat will be a H. O. Bostrom Sierra Air-50RX/HD/LH/ABTS air suspension, high back bucket seat. The seat will have a tapered and padded seat cushion with lumbar support. The seat will have a five inch fore and aft adjustment, a three inch height adjustment with heavy duty damper and a reclining seat back. The seat air ride suspension will be pneumatically controlled from a control switch on the forward lower edge of the seat.

The seat will be equipped with a red integrated 3-point shoulder harness with lap belt and an automatic retractor built into the seat assembly

**OFFICERS SEAT, BOSTROM 450 SCBA,ABTS, FIXED**

The officer's seat will be a H. O. Bostrom Tanker 450 series fixed base high back bucket seat. The seat will have a tapered padded seat cushion and a reclining seat back with lumbar support. The seat will include a SCBA storage area with integral headrest.

The seat {will/shall} be equipped with a red integrated 3-point shoulder harness with lap belt and an automatic retractor built into the seat assembly.

The officer's seat will include a H. O. BOSTROM Secure All™ SCBA Locking System. The bracket system will be free of straps and clamps that may interfere with auxiliary equipment on SCBA units. The center guide fork shall keep the tank in-place for a safe and comfortable fit in seat cavity. Fire fighters will simply push the SCBA unit against the pivot arm to engage the patented auto-locking system. Once the lock is engaged, the top clamp will surround the top of the SCBA tank for a secure fit in all directions.

The standard release handle will be integrated into the seat cushion for quick and easy release and will eliminate the need for straps or pull cords to interfere with other SCBA equipment.

**BOSTROM 450 SCBA ABTS REAR FACING, OUTBOARD, DS**

The driver's side outboard rear facing crew seat will be a H. O. Bostrom Tanker 450 ABTS series fixed base high back bucket seat. The seat will have a tapered and padded seat cushion with lumbar support. The seat will include a SCBA storage area with integral headrest.

The seat will be equipped with a red integrated 3-point shoulder harness with lap belt and an automatic retractor built into the seat assembly.

The driver's side rear facing outboard seat will include a H. O. BOSTROM Secure All™ SCBA Locking System. The bracket system will be free of straps and clamps that may interfere with auxiliary equipment on SCBA units. The center guide fork shall keep the tank in-place for a safe and comfortable fit in seat cavity. Fire fighters will simply push the SCBA unit against the pivot arm to engage the patented auto-locking system. Once the lock is engaged, the top clamp will surround the top of the SCBA tank for a secure fit in all directions.

The standard release handle will be integrated into the seat cushion for quick and easy release and will eliminate the need for straps or pull cords to interfere with other SCBA equipment.

**BOSTROM 450 SCBA ABTS REAR FACING, OUTBOARD, OS**

The officer's side outboard rear facing crew seat will be a H. O. Bostrom Tanker 450 ABTS series fixed base high back bucket seat. The seat will have a tapered and padded seat cushion with lumbar support. The seat will include a SCBA storage area with integral headrest.

The seat will be equipped with a red integrated 3-point shoulder harness with lap belt and an automatic retractor built into the seat assembly.

The officer's side rear facing outboard seat will include a H. O. BOSTROM Secure All™ SCBA Locking System. The bracket system will be free of straps and clamps that may interfere with auxiliary equipment on SCBA units. The center guide fork shall keep the tank in-place for a safe and comfortable fit in seat cavity. Fire fighters will simply push the SCBA unit against the pivot arm to engage the patented auto-locking system. Once the lock is engaged, the top clamp will surround the top of the SCBA tank for a secure fit in all directions.

The standard release handle will be integrated into the seat cushion for quick and easy release and will eliminate the need for straps or pull cords to interfere with other SCBA equipment.

**CENTER FORWARD FACING CREW SEATS**

Two (2) center inboard forward facing crew seats will be provided, each seat will be an H. O. Bostrom Tanker 450 ABTS series fixed high back bucket seat. Each seat will have a tapered and padded seat cushion with lumbar support. Each seat will include an SCBA storage area with integral headrest.

Each seat will be equipped with a red integrated 3-point shoulder harness with lap belt and an automatic retractor built into the seat assembly.

The two (2) center inboard forward facing crew seats will have a flip-up style seat bases.

The center forward facing seats will include a H. O. BOSTROM Secure All™ SCBA Locking System. The bracket system will be free of straps and clamps that may interfere with auxiliary equipment on SCBA units. The center guide fork shall keep the tank in-place for a safe and comfortable fit in seat cavity. Fire fighters will simply push the SCBA unit against the pivot arm to engage the patented auto-locking system. Once the lock is engaged, the top clamp will surround the top of the SCBA tank for a secure fit in all directions.

The standard release handle will be integrated into the seat cushion for quick and easy release and will eliminate the need for straps or pull cords to interfere with other SCBA equipment.

**SEAT UPHOLSTERY MATERIAL**

The seats will be upholstered with heavy duty gray tweed Durawear material as provided by Bostrom.

**PADDED SCBA OPENING COVERS**

Removable padded covers will be provided for the SCBA seat openings.

**SEAT BELT CUSHION SENSORS AND BELT SENSORS**

The apparatus will be equipped with a Class 1 seat belt warning system. The system will consist of a Seat Belt module, dash mounted Icon style display and an audible alarm.

Seat belt and seat cushion sensors will be provided on the six (6) specified seating positions.

**CAB HELMET STORAGE**

Each seat position will have a ZICO: Ziamatic UHH-1 Crew Cab Helmet Holder, meeting NFPA 1901, 2009 for a total of six (6) holders.

**VEHICLE DATA RECORDER**

A Class 1 Vehicle Data Recorder (VDR) system will be provided. The system will include an NFPA compliant "Black Box" with reporting software that will be capable of data storage to coincide with the NFPA requirements.

Data storage capabilities will include interfaces with the following systems:

- Display module (Master Optical Warning Device)
- VDR, date & time stamp
- Max Vehicle speed (MPH)
- Vehicle acceleration / deceleration (MPH/Sec.)

- Engine Speed (RPM)
- ABS event
- Data password protected
- Data sampled once per second, in 48-hour loop
- Data sampled min by min for 100 engine hours
- Throttle position (% of Throttle)
- Data software
- PC / Mac Compatible
- Data summary reports

The VDR data will be downloadable by USB cable to a computer using either Microsoft or Apple operating systems.

**ANTENNA INSTALLATION**

Three (3) antenna mounting base(s) model #MATM with 17' of coaxial cable will be provided and installed on the lower cab roof, behind the light bar. The attached antenna wire(s) will be run to the area behind the officer's seat.

The Fire Department is responsible to have the correct antenna whip installed once the apparatus is delivered.

******* CAB INSTRUMENTATION & CONTROLS *******

**DASH & CENTER CONSOLE**

The dash will be a custom formed ABS plastic module to create an ergonomically designed interior to be user friendly and functional for the driver and officer.

The instrument cluster will be centered in front of the driver and all gauges will be custom fit in the ABS dash with a non-glare wrap around style panel.

All warning lights and indicators will be located in the gauge itself or in the lower center portion. Each gauge will be equipped with an international symbol that is easily recognizable, denoting the system being monitored. Instrumentation will be backlit for easy identification when activated.

The transmission gear selector will be located on the left side of the center dash assembly, toward the driver for easy access.

**DRIVER'S DASHBOARD PANEL**

The main instrument panel will be centered in front of the driver and will be mechanically fastened to the main dash assembly. The dash panel will be 1/8” aluminum with an anti-glare, pewter finish brushed surface. The driver’s dashboard panel will contain the gauge panel along with an instrument warning light cluster.

The main instrument panel contain the primary gauges. An ignition and engine start switch will be located on a panel to the right upper portion of the driver's side dash panel.

Each gauge will have a raised glass lens with a black matte finish trim ring and be backlit by integral white LED's. Each gauge will also possess an integral red warning light with a pre-programmed warning light set point. Each gauge warning indicator will be capable of activating an audible alarm inside the dashboard.

The primary gauges will consist of:

- Vehicle speedometer (0-80 mph)
- Engine tachometer (0-3000 rpm)
- Engine oil pressure (0-100 psi); low oil pressure warning
- Engine coolant temperature (100-250 ℉); high engi ne temp warning
- Transmission oil temperature (100-350 ℉); high tr ansmission fluid temp warning
- Vehicle battery voltage (9-18 VDC); low voltage warning
- Front air system gauge (0-150 psi); low air pressure warning at 65 psi
- Rear air system gauge (0-150 psi); low air pressure warning at 65 psi
- Fuel level (E - 1/2 - F); low fuel level warning
- Air cleaner restriction gauge (0-40), warning at 25"

Additional auxiliary control switches and instruments (if applicable) will be located within the dash panel and overhead panel located near the driver's position.

- Diesel Exhaust Fluid level (E-1/2-F); low fuel level warning @ 1/8 tank

- Engine Compression Brake Controls

**CLASS ONE DISPLAY**

A Information Center display will be provided on the dash for the electrical Class One ES-Key multiplex system. The exact location will determined by the totality of instruments and switches on the cab dash. The display will be in easy reach of the officer to view information.

**INDICATOR CLUSTER**

The driver's dashboard panel will consist of Ametek gauges, an 18 item instrument warning light cluster and a 16 item, dead front type alarm panel.

This display will contain the system control unit that collects data from the vehicle data bus (J1939), analog sensors, and switches throughout the vehicle. This data will be presented using gauges, telltales and the two (2) display panels. The warning light display will include a 2 x 20 dot matrix display, 18 telltales and 2 buttons to navigate through the screen menus.

The LCD dot matrix display will be a 2 line by 20-character display with each character being 7 dot by 5 dot configuration. FSTN technology will be used on the display for wide viewing capability. The module will be backlit with amber LED's. The unit will also be supplied with a heater to ensure proper operation over the entire 40 to +85 deg. C.

This display contains a series of two (2) screens to provide information about the vehicle. To control the display of that information, the screens are divided into two (2) menus; one that can be displayed while the vehicle is in motion and one that can only be accessed when the parking brake is set.

On the Road displays include:

- Two (2) configurable displays that can show any of the parameters the unit collects. This includes odometer, trip information, fuel economy information; all gauge data, and virtually any other data available on the vehicle that the display has access to, either through the data bus or via analog inputs.
- Two (2) trip displays for miles and hours that are capable of being reset.

- Two (2) fuel data screens: will be provided; one for fuel remaining until empty and one for fuel economy. The fuel economy display will be capable of being reset so that average economy over a predetermined period can be displayed.

The displays that can be accessed when the parking brake is set include:

- Engine hours as maintained by the engine ECU
- Service Alarm screens to report miles to next service or miles past required service. These screens will allow the operator to choose the length of the service interval and will have the ability to reset it.
- Message screens with warning messages the display has collected during the current ignition cycle. These screens will be divided into configured warnings such as “Low Air Pressure” and the data bus faults reported by ECU's on the vehicle. Both lists will allow the operator to review the last 12 events that occurred on the vehicle for maintenance and troubleshooting purposes.
- Diagnostic screens will test the instrumentation system to verify it is working correctly.
- Setup screens will be used to select either English or metric display. They will also allow the operator to choose the data that will be displayed by the configurable on-the-road screens.

The system will be configured with user defined warning messages such as Low Air Pressure or High Coolant Temperature. When these events occur the warning message will come up on the screen and can be accompanied by a buzzer. The messages will be prioritized so the most important messages are always displayed. Whether the message can be dismissed by pressing a button will be configurable. Messages that have been dismissed but are still active will be retained in the message screens for review until the ignition is turned off. Listed below are the defined telltales and their indicators.

- "Right And Left Directional" arrows (green in color)
- "Ignition ON" Indicator (amber in color)
- "Hi Beam" indicator (blue in color)
- "Battery ON" indicator (green in color)
- "Parking Brake ON" indicator (red in color)
- "Check Transmission" indicator (amber in color)
- "Cab Not Latched" indicator (red in color)
- "Stop Engine" indicator (red in color)
- "Check Engine" indicator (amber in color)
- "ABS Warning" indicator (red in color)
- "Low Coolant Level" (red in color)
- "Fuel Restriction" indicator (amber in color)
- "Water In Fuel" indicator (amber in color)
- "Fasten Seat Belts" indicator (red in color)
- "Fast Idle" Indicator (amber in color)
- "Do Not Move Truck" indicator (red in color)
- "DPF Regeneration" (amber in color)
- "Exhaust High Temperature" (amber in color)
- "Engine Diagnostic Fault" (amber in color)
- "Retarder On" (green in color)

Listed below are indicators that may be included, depending upon the vehicle configuration:

- "Wait To Start" indicator (amber in color)
- "Exhaust System Fault" (amber in color)
- "Topps System Fault" (amber in color)
- "Lube System Active" (amber in color)

- "Jacks Not Stowed" (red in color)
- "PTO Engaged" (green in color)
- "Inter Axle Lock" (amber in color)
- "4x4" (green in color)
- "Driver Controlled Diff Lock" (green in color)
- "Ok to Pump" (green in color)
- "Auto Traction Control" (amber in color)
- "Retarder Active" (amber in color)
- "Auxiliary Brake Active" (amber in color).

**LOWER LEFT AUXILIARY SWITCH PANEL**

The driver's lower left panel will be capable of housing five (5) guarded type rocker switches. Examples of the switches that will be installed in this area are automatic chains, fan clutch override, ATC, inter-axle diff lock, electric fuel pump, all wheel drive, etc.

**PUMP SHIFT CONTROL**

The pump shift control and pump engaged indicator light will be mounted in the driver's lower left panel. This control will be equipped with a mechanical type lock to prevent inadvertent activation or de-activation. The lever positions and indicator light shall be clearly marked.

**CAB HEATER/DEFROSTER**

A SGM heater/defroster, rated at 32,900 BTU/HR will be provided, with a minimum 500 CFM total air flow. The unit will supply heat to the cab and provide windshield defrosting through adjustable louvers. The heater/defroster will be mounted in the center overhead console area, near the windshield. Control will be located on the front of the heater/defroster unit.

**PANTHER OVERHEAD AIR CONDITIONING SYSTEM**

A climate-control system will be provided for total cab environmental comfort. This system will be able to provide heat and cooling capabilities to various areas in the cab. The system will consist of one (1) evaporator unit mounted in the center overhead of the cab and a roof mounted condenser. This system will provide conditioned air for the front and rear area of the cab.

The ceiling mounted evaporator/heater unit will include the following:

- Dual high output blower.
- High efficiency coil that includes "rifled" tubing and oversized header tubes for maximum refrigerant distribution.
- Six (6) adjustable 3" diameter louvers will be furnished; three (3) louvers located in the forward area of the cover and three (3) louvers located in the rear for the crew area.
- An electric water valve in the heat mode controls temperature.
- Unit housing is fully insulated.
- Heating BTU: 50,000
- Air Conditioning BTU" 34,000
- CFM: 410 @ 13.8 volts.

The roof mounted condenser will be strategically positioned on the cab roof so as not to interfere with any emergency lighting systems and will include the following:

- High performance, long life fan assemblies. Fan motors are sealed around housing and shaft areas.
- Condenser and coil design includes rifled tubing for maximum efficiency. Coil is painted black.
- Condenser unit includes receiver drier with hi/lo pressure switch.
- Wire harness includes necessary wiring for clutch circuit as well as a separate power relay circuit.
- 14-gauge mounting brackets
- 16-gauge condenser frame and fan shroud
- 16-gauge aluminum cover, E-coated white.

Mounting design will enable easy servicing of all components and unit replacement if necessary. The evaporator unit will be covered with an ergonomically designed painted aluminum cover to provide maximum headroom and a pleasing appearance

**AIR CONDITIONING CONTROLS**

The air conditioning control will be mounted on the overhead panel above the driver. These controls will consist of an ON/OFF switch, temperature control switch, heat/cold control switch and three speed fan switch. All switches will be mounted in a removable panel and will be clearly labeled and adequately backlit.

**CAB TILT ASSEMBLY**

A hydraulic cab lift system will be provided, consisting of an electric-powered hydraulic pump, fluid reservoir, dual lift cylinders, remote cab lift controls and all necessary hoses and valves.

The cab tilt mechanism will be custom designed for ease of maintenance and consist of two (2) hydraulic cylinders with a maximum lift capacity of 19,625 pounds. Hydraulic lines will be rated at 20,000 PSI burst pressure. The hydraulic cylinders will be equipped with a velocity fuse that protects the cab from accidentally descending when the cab is in the tilt position.

Hydraulic cylinders will be detachable to allow removal of the engine for major service. A remote cable operated mechanical cylinder stay bar and release will be provided to insure a positive lock in the tilted position.

The two (2) rear outboard cab latches will be of the hydraulic pressure release, automatic re-latching type, and provide an automatic positive lock when the cab is lowered. The latch will not disengage or experience any damage when subjected to a pull apart tensile load of 6,000 lbs. The hydraulic pressure required to unlock the latch will not exceed 550 PSI. The latch will withstand 5,000 PSI without leaks or damage and withstand 1,000 continuous cycles of operation under a load of 1,000 lbs at liftoff. The tilt pump will be electric over hydraulic type, with a pressure rating of not less than 4,000 PSI. Additionally, the cab tilt device will be both electrically and hydraulically interlocked to prevent inadvertent activation of the cab tilt system.

- A "CAB NOT LATCHED" indicator will be provided in the cab dash-warning cluster.
- A dual switch control system will be provided for the cab tilt, located on the passenger side of the vehicle or on the optional tether control. System will consist of a three (3) position toggle switch along with a rubber covered push button switch.

**AUXILIARY MANUAL CAB LIFT**

An auxiliary manual cab lift back up system will be furnished inside the passenger side of the pump enclosure for use in the event of total electrical shutdown.

The cab tilt control will be equipped with an interlock that will disable the cab tilt system in the event the parking brake is not applied.

**CHASSIS FRAME ASSEMBLY**

The chassis frame will be fabricated in its entirety in the KME factory. This will prevent any split responsibility in warranty or service.

The frame will consist of two (2) channels fastened together by cross members. All structural fasteners used in the frame will be Grade 8 hardware. Hardened steel washers will be used under all bolt heads and nuts to avoid stress concentrations. Top flange will be free of bolt heads. All spring hangers will be machined steel castings. Weldment type chassis and the use of Huck are never used at KME.

Each main frame rail will be 10-1/4" x 4" x 3/8", fabricated from 110,000 PSI minimum yield steel, with a minimum section modulus of 17.97 cu in and a resisting bending moment (RBM) of 1,976,700 inch pounds.

The cross members, axles and steering gear(s), will be finish painted before installation of any electrical wiring, fuel system components, or air system components. All components or brackets fastened to the frame rails will be cleaned, primed and painted prior to being attached to the frame rails.

***** FRONT BUMPER, EXTENSION & ACCESSORIES *****

**FRONT BUMPER**

A 12" high, 101" wide, two (2) ribbed, bright finish stainless steel front bumper will be provided. The bumper will be a wrapped design to match the contour of the front cab sheet.

The bumper will be extended 20" with a polished aluminum tread plate gravel shield enclosing the top and ends.

**STORAGE WELL - CENTER**

One (1) storage well constructed of 1/8" aluminum will be installed in the gravel shield. This storage well will be center mounted between the chassis frame rails. The bottom of the storage well will have a minimum of four (4) drain holes.

One (1) hinged, latched, aluminum tread plate cover will be installed on the storage well located in the center of the bumper extension.

The tread plate hose well cover will have a notch cut out to allow pre-connection of suction/discharge hose.

The center storage well will be equipped with Turtle Tile material to provide drainage and ventilation of equipment in storage well.

**FRONT TOW HOOKS**

Two (2) chrome plated tow hooks will be provided, mounted below the front bumper attached directly to the frame. The tow eyes will be fastened with grade 8 bolts and nuts.

**FRONT AXLE**

Front axle will be a Meritor MFS-20-133 A-N, reversed Elliott "I" beam type and include low friction "Easy Steer" bushing technology for maximum steering ease and longer life.

The front axle will be rated at 20,000 lbs.

**FRONT DISC BRAKES**

Meritor EX-225 H, 17" disc brakes will be provided for the front axle. The front brakes will be full air actuated with automatic slack adjustment.

**FRONT SUSPENSION**

Front suspension will be progressive rate front leaf springs. The spring will be permanently pinned at the front and have a shackle double pinned mounting at the rear.

The front leaf springs will have a minimum of 9 leaves, a minimum length of 51", and a minimum width of 3-1/2". The capacity at ground will be 20,000 lbs., or exceed the capacity of the axle, unless specified to the contrary in this specification. All springs will be of center bolt design. All springs will be positively restrained from rotating in brackets and shackles.

**FRONT SHOCK ABSORBERS**

The front suspension system will be equipped with Monroe, model "Magnum - 70", double acting hydraulic shock absorbers. Shock absorbers to have a minimum bore of 1.38" and an outside diameter of approximately 3-1/4".

**REAR AXLE**

Rear axle will be a single, Meritor RS-26-185 with a capacity of 27,000 lbs. (Minimum). Axle will be a single reduction axle with hypoid gearing and oil-lubricated wheel bearings. Oil seals will be provided as standard equipment.

**REAR BRAKES**

Meritor EX-225 H, 17" disc brakes will be provided for the rear axle. The rear brakes will be full air actuated with automatic slack adjustment.

**REAR AXLE TOP SPEED**

The rear axle/s will be geared for a vehicle top speed in accordance with NFPA sections 4.15.2 and 4.15.3.

Units with GVWR over 26,000 pounds will be limited to 68 mph. If the combined tank capacity is over 1250 gallons of foam and water or the GVWR is over 50,000 pounds, the vehicle top speed will be limited to 60 mph or the fire service rating of the tires, whichever is lower.

**TIRE CHAINS**

The vehicles rear drive axle will be equipped with an On-Spot tire chain system. The system will utilize the existing vehicle air compressor system. A switch will be provided in the drivers console area to control the activation of the chains. The switch will have a safety feature, which does not allow for inadvertent activation.

**REAR SUSPENSION**

A Hendrickson "FIREMAAX" model #FMX-272 air ride suspension will be provided for the single rear axle. The suspension will have a weight rating equal to the rear axle weight rating up to 27,000 pounds.

******* AIR & BRAKE SYSTEM *******

**BRAKE SYSTEM**

A dual circuit, air operated braking system, meeting the design and performance requirements of FMVSS -121 and the operating test requirements of NFPA 1901 current edition will be installed. It will be direct air type with dual air treadle in the cab. The system will be powered by an engine mounted, gear driven air compressor protected by a heated air dryer.

The air system will be plumbed with reinforced, air brake tubing/hose in conformance to SAE J 844-94, Type B and U.S.D.O.T. standards. The compressor discharge will be plumbed with stainless steel braided hose lines with a Teflon lining. Eaton Synflex Eclipse Air Brake tubing will be run along the inside frame rails and connected with Eaton Q-CAB 217 series fittings that meet or exceed all industry standards. All Synflex will be secured with non-conductive, corrosion resistant strapping mounted with standoff fasteners. Cord reinforced rubber hose lines with brass fittings will be installed from the frame rails to axle mounted air connections.

The air system will provide a rapid air build-up feature and low-pressure protection valve with light and buzzer, designed to meet the requirements of NFPA 1901, current edition.

**ABS SYSTEM**

An Anti-Skid Braking System (ABS) will be provided to improve braking control and reduce stopping distance. This braking system will be fitted to all of the axles. All electrical connections will be environmentally sealed, water, weatherproof, and vibration resistant.

The system will constantly monitor wheel behavior during braking. Sensors on each wheel will transmit wheel speed data to an electronic processor which will sense approaching wheel lock causing instant brake pressure modulation up to 5 times per second in order to prevent wheel lockup. Each wheel will be individually controlled.

To improve service trouble shooting, provisions in the system for an optional diagnostic tester will be provided. The system will test itself each time the vehicle is started. A dash-mounted light will go out once the vehicle has attained 4 mph after successful ABS start-up. To improve field performance; the system will be equipped with a dual circuit design. The system circuits will be configured in a diagonal pattern. Should a malfunction occur, the defective circuit will revert to normal braking action. A warning light will signal malfunction to the operator. The system will consist of a wheel mounted toothed ring, sensor, sensor clip, electronic control unit and solenoid control valve.

The sensor clip will hold the sensor in close proximity to the toothed ring. An inductive sensor consisting of a permanent magnet with a round pole pin and coil will produce an alternating current with a frequency proportional to wheel speed. The unit will be sealed, corrosion resistant and protected from electromagnetic interference. The electronic control unit will monitor the speed of each wheel. A deviation will be corrected by cyclical brake application and release. If a malfunction occurs, the defective circuit will signal the operator and the malfunctioning portion of the system will shut down. The system will be installed in a diagonal pattern for side-to-side control. The system will insure that each wheel is braking to optimum efficiency up to 5 times a second.

The system will also control application of the auxiliary engine exhaust or drive line brakes to prevent wheel lock.

This system will have a three (3) year or 300,000 mile parts and labor warranty as provided by Meritor Wabco Vehicle Control Systems.

**ELECTRONIC STABILITY CONTROL (ESC)**

An Electronic Stability Control (4 or 6 Channel) will be provided as part of the Standard ABS system. The Electronic Stability Control system is capable of recognizing and assisting in both rollover and vehicle-under and over-steer situations through advanced monitoring of vehicle parameters and automatic and selective application of the chassis brakes. The Electronic Stability system uses lateral and yaw accelerometers, wheel speed sensors, ABS pressure modulator valves and an ECU to control the four corners of a vehicle. The controller monitors the vehicle response to turning and braking and adjusts or modulates the brake pressure at the wheel end to slow the vehicle in roll control, stabilize the vehicle when under or over steering, and modulate brake pressure when excessive wheel slip, or wheel lockup is detected. By these actions, the ESC system helps to maintain the vehicle’s lateral and roll stability at all times, and improves braking and steer ability during heavy brake applications and during braking on slippery surfaces.

**AUTOMATIC TRACTION CONTROL (ATC)**

To further improve vehicle drive characteristics, the unit will be fitted with automatic traction control (ATC). This system will control drive wheel slip during acceleration from a resting point. An extra solenoid valve will be added to the ABS system. The system will control the engine and brakes to ensure efficient acceleration. The system will be equipped with a dash-mounted light that will come on when ATC is controlling drive wheel slip. The system will also include an "off road traction" dash mounted switch that will allow the operator to momentarily allow for more wheel slip when the unit is in deep mud or snow.

This system will have a three (3) year or 300,000 mile parts and labor warranty as provided by Meritor Wabco Vehicle Control Systems.

**BRAKE AIR RESERVOIRS**

There will be a minimum of three (3) air reservoirs installed in conformance with best automotive practices. Reservoir capacity total will be a minimum of 4700 cubic inches.

The air reservoirs will be color coded to match the air lines for easy identification, ease of maintenance and troubleshooting. The reservoirs will be painted the following colors:

- Wet Tank — Black
- Primary Tank — Green
- Secondary Tank — Blue
- Auxiliary Tank(s) — Yellow

For ease of daily maintenance, each air system reservoir will be equipped with a brass 1/4 turn drain valve.

A Rockwell/Wabco System Saver 1200 heated air dryer will be furnished. An automatic moisture ejector on the primary or wet tank will also be furnished.

**AIR LINES**

The entire chassis air system will be plumbed utilizing reinforced, Synflex air lines. All of the airlines will be color coded to correspond with an air system schematic and will be adequately protected from heat and chafing.

**AIR COMPRESSOR**

Air compressor will be a Wabco brand, minimum of 18.7 cubic feet per minute capacity. Air brake system will be the quick build up type. The air compressor discharge line will be stainless steel braid reinforced Teflon hose.

A pressure protection valve will be installed to prevent the use of air horns or other air operated devices should the air system pressure drop below 80 psi (552 kPa).

The chassis air system will meet NFPA 1901, latest edition for rapid air pressure build-up within sixty (60) seconds from a completely discharged air system. This system will provide sufficient air pressure so that the apparatus has no brake drag and is able to stop under the intended operating conditions following the sixty (60) seconds build-up time.

**BRAKE TREADLE VALVE**

A Bendix dual brake treadle valve will be mounted on the floor in front of the driver. The brake control will be positioned to provide unobstructed access and comfort for the driver.

**PARKING BRAKE**

Parking brake will be of the spring-actuated type, mounted on the rear axle brake chambers. The parking brake control will be mounted on the cab center instrument panel, offset toward the driver. A red indicator light will be provided in the driver dash panel that will illuminate when the parking brake is applied.

**FRONT WHEELS & TIRES**

The front wheels will be 22.5" x 12.25" ten stud, hub piloted polished aluminum disc type.

The aluminum disc front wheels will be provided with bright nut covers and hub caps.

The front tires will be Michelin 385/65R22.5 "20 Ply" tubeless radial XFE wide base highway tread. The tires will be fire service rated up to 20,000 lbs and will have a top speed of 75 mph when inflated to 120 psi.

Fire Service Rating means operations not to exceed one hour loaded travel at maximum speed, with at least a one hour cool down prior to another loaded run.

Industry load and inflation standards are in a constant state of change. Printed material may not reflect the latest load and inflation standards.
NOTE : NEVER EXCEED THE MAXIMUM AIR PRESSURE LIMITATION.

**REAR WHEELS & TIRES**

The single rear axle wheels will be 22.5" x 8.25" ten stud, hub piloted polished aluminum disc type.

The single rear axle aluminum disc wheels will be provided with bright nut covers and hub caps.

The rear tires will be Michelin 12R22.5 "16 Ply" tubeless radial XDS traction tread. The tires will be fire service rated up to 28,880 lbs and will have a top speed of 75 mph when inflated to 120 psi.

Fire Service Rating means operations not to exceed one hour loaded travel at maximum speed, with at least a one hour cool down prior to another loaded run.

Industry load and inflation standards are in a constant state of change. Printed material may not reflect the latest load and inflation standards.

NOTE : NEVER EXCEED THE MAXIMUM AIR PRESSURE LIMITATION.

**TIRE PRESSURE MONITORING DEVICES**

Each tire will be equipped with an air pressure indicator cap on the valve stem. Each cap will have a visual LED indicator to show if the tire is correctly inflated.

**VALVE EXTENSION STABILIZERS**

The rear tire and wheel assemblies will be equipped with valve extensions and stabilizers.

******* ENGINE, TRANSMISSION & ACCESSORIES *******

**ENGINE**

Engine will be a Cummins, 2010 Model ISL 450, diesel, turbo-charged, electronically controlled, per the following specifications.

- Max. Horsepower 450 HP @ 2100 RPM
- Governed Speed 2200 RPM
- Peak Torque 1250 lb. ft. @ 1400 RPM
- Cylinders Six (6)
- Operating Cycles Four (4)
- Bore & Stroke 4.49 x 5.69 in.
- Displacement 543 cu. in.
- Compression Ratio 16.6:1
- Governor Type Limiting Speed
- Drive line Size 1710.

Engine oil filters will be engine manufacturers branded or approved equal. Engine oil filters will be accessible for ease of service and replacement.

A fuel/water separator will be provided.

**ENGINE BASE WARRANTY**

The Cummins engine will be warranted for a period of five (5) years or 100,000 miles, whichever occurs first.

**ENGINE CERTIFICATION KME CHASSIS**

Engine will be installed in accordance with engine manufacturer's instructions. The manufacturer will be able to furnish proof of engine installation approval by the engine manufacturer.

**COOLING/RADIATOR**

The radiator and the complete cooling system will meet or exceed NFPA and engine manufacturer cooling system standards.

To provide maximum corrosion resistance and cooling performance, the entire radiator core will be constructed using long life aluminum alloy. The core will be made of aluminum fins, having a serpentine design, brazed to aluminum tubes. The tubes will be brazed to aluminum headers. No solder joints or leaded material of any kind will be acceptable in the core assembly.

The radiator core will have a height of 35.92" x a width of 37.62". Supply and return tanks made of glass-reinforced nylon will be crimped on to the core assembly using header tabs and a compression gasket to complete the radiator core assembly. The radiator will be compatible with commercial antifreeze solutions.

There will be a full steel frame around the entire radiator core assembly. The radiator core assembly will be isolated within the steel frame by rubber inserts to enhance cooling system durability and reliability. The radiator will be mounted in such a manner as to prevent the development of leaks caused by twisting or straining when the apparatus operates over uneven ground. The radiator assembly will be isolated from the chassis frame rails with rubber isolators.

The cooling system will include a deaeration tank mounted to the top of the radiator framework. The radiator will be equipped with a 15 psi pressure relief cap.

The cooling system will be designed for a maximum of fifteen (15) PSI operation.

A drain port will be located at the lowest point of the cooling system and/or the bottom of the radiator to permit complete flushing of the coolant from the system.

Extended life engine coolant will provide anti-freeze protection to -30° F. The mixture will be per the engine manufacture's specifications.

The engine cooling system will be certified by the engine manufacturer to meet cooling index requirements for a minimum ambient temperature or 110-degrees Fahrenheit.

**TRANSMISSION COOLER**

A shell and tube transmission oil cooler will be provided using engine coolant to control the transmission oil temperature. The cooler will have an aluminum shell and copper tubes. The cooler will be assembled using pressed in rubber tube sheets to mechanically create a reliable seal between the coolant and the oil. No brazed, soldered, or welded connections will be used to separate the coolant from the oil.

**RADIATOR SKID PLATE**

The radiator installation will include a heavy-duty radiator skid plate to protect the radiator from debris or obstructions under the chassis. The skid plate will be designed so the angle of approach is not affected.

**CHARGE AIR COOLER**

The charge air cooler will be constructed of aluminum with cast aluminum side tanks. To not restrict air flow to the radiator, the charge air cooler will designed to be an integral part of the radiator assembly, mounted directly on top of the radiator. Rubber isolators will be used at the mounting points to reduce transmission of vibrations.

The piping between the charge air cooler and engine will use heavy duty hoses with stainless steel bands. Bands are used to maintain the shape of the hose during changing turbo boost pressures. The hoses will be attached with stainless steel constant torque hose clamps.

Charge air coolers that are located in front of the radiator, that block or restrict air flow into the engine radiator or introduce above ambient temperature air into the radiator in any way are not used at KME.

**COOLING SYSTEM FAN**

The engine cooling system will incorporate a heavy duty fan, installed on the engine and include a shroud.

The fan will be equipped with an air operated clutch fan, which will activate at a pre-determined temperature range.

Re-circulation shields will be installed to ensure that air which has passed through the radiator is not drawn through it again.

Premium Goodyear Hi-Miler® blue heater and coolant hoses will be furnished for the heater and coolant system. The hose will have a core of black Versigard (EPDM) with spiral flextan reinforcement and blue Versigard coating. All coolant hoses will be equipped with constant torque type hose clamps. All integral hoses supplied with the engine will be as supplied by the engine manufacturer.

**ENGINE BRAKE**

An engine compression brake will be furnished for increased braking capabilities. Controls will be as provided by the engine manufacturer and will be activated by releasing the throttle pedal to the idle position.

The engine compression brake will have dash mounted control switches to turn the brake on or off as well as to control the operational level of the brake.

The engine brake will be wired in such a manner so as to illuminate the chassis brake lights when the engine brake is engaged and operating.

The engine brake will be interlocked with the PTO operation and will automatically disengage any time the apparatus is operating with the PTO active.

**ENGINE FAST IDLE**

A fast idle for the electronic controlled engine will be provided. The fast idle will be controlled by an ON/OFF switch on the dash.

An electronic interlock system will prevent the fast idle from operating unless the transmission is in "Neutral" and the parking brake is fully engaged. If the fast idle control is used in conjunction with a specified engine/transmission driven component or accessory, the fast idle control will be properly interlocked with the engagement of the specified component or accessory.

**AIR CLEANER**

An engine air cleaner will be provided. The air cleaner will include a dry type element and will be installed in accordance with the engine manufacturer's recommendations. The air cleaner will be located to the rear of the engine, with streamline air pipes and hump hose connections from the inlet to the air cleaner and from the air cleaner to the turbo. The air cleaner will be easily accessible when the cab is tilted. The air cleaner will be plumbed to the air intake system that will include a self sealing connection between the cab and air cleaner assembly to allow the cab to be tilted.

**SPARK ARRESTOR**

A spark arrestor will be installed in the chassis air intake system. This arrestor will be mounted behind the intake grille to filter out airborne embers. The spark arrestor housing must be easily accessible when the cab is tilted.

**ACCELERATOR CONTROL**

A floor mount accelerator pedal will be installed on the floor in front of the driver. The pedal will be positioned for comfort with ample space for fire boots and adequate clearance from the brake pedal control.

**REMOTE THROTTLE CONTROL HARNESS**

An apparatus interface wiring harness for the engine will be supplied with the chassis. The harness will include a connector for connection to the chassis harness which will terminate in the left frame rail behind the cab for reconnection to required throttle control harnesses. The harness will contain necessary connectors for a pressure governor and a multiplexed gauge. Separate circuits will be included for pump controls, “Pump Engaged” and “OK to Pump” indicator lights, open compartment ground, start signal, park brake ground, ignition signal, master power, customer ignition, air horn solenoid switch, high idle switch and high idle indication light.

An apparatus interface wiring harness will also be included which will be wired to the cab harness interface connectors and will incorporate circuits with relays to control pump functions. This harness will control the inputs for the transmission lock up circuits, governor/hand throttle controls and dash display which will incorporate “Pump Engaged” and “OK to Pump” indicator lights. The harness will contain circuits for the apparatus builder to wire in a pump switch.

**ENGINE PROGRAMMING REMOTE THROTTLE**

The engine ECM (Electronic Control Module) discreet wire remote throttle circuit will be turned off for use with a J1939 based pump controller or when the discreet wire remote throttle controls are not required.

**TRANSMISSION**

An Allison World Transmission, Model 3000 EVS electronically controlled, automatic transmission will be provided. Transmission specifications will be as follows:

- Max. Gross Input Power 450 HP
- Max. Gross Input Torque 1250 lb. ft.
- Input Speed (Range) 2000- 2800 RPM
- Shift Calibrations 5 Speed
- Direct Gear (Pumping) 4th (Lock-up)
- Direct Gear Ratio 1.00:1
- Overdrive Ratio 0.75:1.

Transmission installation will be in accordance with the transmission manufacturer's specification. The transmission will be readily and easily removable for repairs or replacement.

Two (2) PTO openings will be located on left side and right side of converter housing (positions nine (9) o'clock and three (3) o'clock).

An illuminated, touch-pad type shift control will be mounted in the cab, convenient to the driver. Shift control will be approved by the transmission manufacturer.

**TRANSMISSION OIL LEVEL SENSOR**

The transmission will be equipped with the oil level sensor (OLS); this sensor will allow the operator to obtain an indication of the fluid level from the shift selector. The sensor display will provide the following checks, correct fluid level, low fluid level and high fluid level.

**PARK TO NEUTRAL**

The transmission, upon application of the parking brake, will automatically shift into neutral.

**TRANSMISSION FLUID**

TES- 389 transmission fluid will be utilized to fill the 3000 EVS transmission.

**DRIVE LINES**

Drive lines will be Dana (Spicer) 1710 heavy duty series or equal, with "glide coat" splines on all slip shafts. The chassis manufacturer will utilize an electronic type balancing machine to statically and dynamically balance all drive shafts. KME will provide proof of compliance with all drive shaft manufacturer's standards and specifications.

**DIESEL EXHAUST FLUID TANK**

A five (5) gallon diesel exhaust fluid (DEF) tank will be provided and installed. The tank will be mounted in the area of the battery box and will be accessible through a door in the crew area step well.

The tank will include an internal heater that will be fed by engine coolant directly from the engine block to ensure it is always kept at the proper temperature per EPA requirements. The tank will include a temperature sensor to control the flow of the engine coolant from the heater valve to the DEF tank.

A DEF fluid level senor will be provided with the DEF tank and connected to the level gauge on the dashboard.

**EXHAUST SYSTEM**

The exhaust system will be installed in accordance with the engine manufacturer's requirements and meet all Environmental Protection Agency and State noise level requirements. Exhaust system components will be securely mounted and easily removable.

The diesel particulate filter/muffler will be fabricated from stainless steel and of a size compatible with the engine exhaust discharge.

Exhaust tubing will be a minimum of 16 gauge stainless steel from the turbocharger on the engine to the inlet of the diesel particulate filter. Any flexible exhaust tubing will be HDT stainless steel type. To minimize heat build-up, exhaust tubing within the engine compartment will be wrapped with an insulating material. Exhaust will be wrapped from the turbocharger to the entrance of the muffler. Material will be held in place with worm gear type clamps.

An exhaust diffuser will be provided to reduce the temperature of the exhaust as it exits the tailpipe.

The computer controlling the engine will be programmed in such a manner that it will not allow the engine to go into regen mode while the fire pump is engaged. Separate "regeneration" enable and prohibit switches will be provided under the dash board on the driver's side. Each switch will be provided with a spring loaded protective cover and will be clearly marked as to function.

**SELECTIVE CATALYTIC REDUCTION (SCR)**

The vehicle will be equipped with SCR technology that uses a urea based diesel exhaust fluid (DEF) and a catalytic converter to significantly reduce oxides of nitrogen (NOx) emissions.

The SCR system will reduce levels of NOx (oxides of nitrogen emitted from engines) by injecting small quantities of diesel exhaust fluid (DEF) into the exhaust upstream of a catalyst, where it vaporizes and decomposes to form ammonia and carbon dioxide. The ammonia (NH3), in conjunction to the SCR catalyst, converts the NOx to harmless nitrogen (N2) and water (H2O).

The exhaust tailpipe extending from the SCR catalyst to the side of the vehicle will be constructed from 16-gauge aluminized steel tubing. The exhaust discharge will be on the officer side of the apparatus forward of the rear axle.

****** FUEL SYSTEM ******

**FUEL TANK**

Fuel tank will be a minimum of fifty (50) gallon capacity. It will have a minimum fuel filler neck of 2" ID. A 1/2" minimum diameter drain plug will be provided. The tank will be fabricated from hot rolled, pickled and oiled steel. Provisions for an additional feed line and fuel level float will be provided for future use.

The fuel tank will be installed behind the rear wheels between the frame rails.

The fuel tank will meet all FHWA 393.67 requirements including a fill capacity of 95% of tank volume.

The fuel tank will be able to withstand a longitudinal acceleration of -23.0g at 0.166 seconds in accordance to SAE J211 standards using a channel frequency class 600 filter. Testing will be performed at and verified by a third party testing and evaluation center.

The fuel lines will be textile reinforced synthetic rubber or plastic hose that is approved for use with diesel fuel and has a minimum max temperature rating of 250° F. The lines will be sized to meet engine manufacture's requirements, and will be carefully routed and secured along the inside of the frame rails.

**FUEL FILTER/WATER SEPARATOR**

A fuel filter/water separator will be provided in the fuel system. A "water in fuel" indicator will be provided on the dash.

**SECONDARY ELECTRIC FUEL PUMP**

In addition to the primary fuel pump, a secondary electric fuel pump for re-priming will be furnished in the main fuel line. A labeled control switch will be provided on the main dash panel.

**FUEL POCKET**

A fuel fill will be provided in the left side rear wheel well area. A Cast Products heavy duty cast aluminum spring loaded hinged fill door will be provided.

A label indicating "Ultra Low Sulfur Diesel Fuel Only" will be provided adjacent to the fuel fill.

**DUAL POWER STEERING**

A dual power steering system will be provided utilizing a Sheppard model #M110 main steering gear on the driver side of the chassis and a Sheppard model #M90 assist steering gear on the officer side of the chassis.

The power steering gear on the officer side of the chassis will increase performance in turning the officer side wheel assembly, reducing loads and forces on the main gear and components.

The steering system will be designed to maximize the turning capabilities of the front axle no matter the rating and tire size. The use of a power assist cylinder on the officer side of the chassis is NOT ACCEPTABLE at KME on front axles of this capacity.

The system will be designed utilizing an engine driven hydraulic pump, with a maximum operating pressure of 2000 PSI. Steering design will permit a maximum of 5.6 turns from stop to stop. Steering system components will be mounted in accordance with the steering gear manufacturer's instructions.

**STEERING COLUMN**

The steering column will be a “Douglas Autotech” tilt and telescope column. A lever mounted on the side of the column will control the tilt and telescope features.

The steering shaft from the column to the miter box will have a rubber boot to cover the shaft slip and a second rubber boot to seal the passage hole in the floor.

There will be a self-canceling, directional signal lever. windshield wipe / wash controls and traffic hazard switch on the steering column. The high beam activator will be controlled by pulling the directional signal lever toward the driver.

**SMARTWHEEL STEERING WHEEL**

The steering column will be a "Smart Wheel" multiplexed steering wheel. The "Smart Wheel" will be designed so that the driver's hands never need to leave the steering wheel once the engine is running and the parking brake is released.

The "Smart Wheel" steering wheel will include ten (10) multiplexed switches that control the following functions:

- Air Horn
- Electric Horn
- Q2B (If Equipped)
- Q2B Brake (If Equipped)
- Master Warning Switch
- Mic (Push to talk)
- Siren
- Auxiliary Braking
- Cruise/Throttle Up
- Cruise/Throttle Down
- Cruise Set

The functions will be multiplexed through a clock spring circuit board. Collector rings switch wiring is not acceptable! The steering wheel will be 18 inches in diameter.

The turn signal switch will include the following functions:

- Left and right turn signals
- High beam dimmer control
- Hazard warning switch
- Two speed with intermittent windshield wiper control
- Windshield washer control

**ROAD SAFETY KIT**

A road safety kit will be furnished with the following equipment:

- 2 1/2 lb. B-C fire extinguisher
- Triangle safety reflectors.

******* CHASSIS/BODY ELECTRICAL & ACCESSORIES *******

**CHASSIS ELECTRICAL SYSTEM**

All electrical wiring in the chassis will be SXL cross link insulated type. Wiring is to be color coded and include function codes every three (3) inches on both sides. Wiring harnesses will be routed in protective, heat resistant loom, securely and neatly installed. Two (2) power distribution centers will be provided in central locations for greater accessibility. The power distribution centers will contain automatic thermal self resetting breakers, power control relays, flashers, diode modules, daytime driving light module, and engine and transmission data links. All breakers and relays will have a capacity substantially greater than the expected load on the related circuit, thus ensuring long component life. Power distribution centers will be composed of a system of interlocking plastic modules for ease in custom construction.

The power distribution centers are function oriented. The first is to control major truck function. The second will control center to overhead switching and interior operations. Each module is single function coded and labeled to aid in troubleshooting. The centers will also have accessory breakers and relays for future installations. All harnesses and power distribution centers will be electrically tested prior to installation to ensure the highest system reliability.

All external harness interfaces will be of a triple seal type connection to ensure a proper connection. The cab/chassis and the chassis/body connection points will be mounted in accessible locations. Complete chassis wiring schematics will be supplied with the apparatus.

**WIRING HARNESS DESCRIPTION**

The wiring harness contained on the chassis will be designed to utilize wires of stranded copper or copper alloy of a gauge rated to carry 125% of maximum current for which the circuit is protected without exceeding 10% voltage drop across the circuit. Wiring will be uniquely identified by color code or circuit function code, labeled at a minimum of every three (3) inches. The identification of the wiring will be referenced on a wiring diagram. All wires conform to SAEJ1127 (Battery Cable), SAEJ1128 (Low Tension Primary Cable), SAEJ1560 (Low Tension Thin Wall Primary Cable).

The covering of harnesses will be moisture resistant loom with a minimum rating of 289° Fahrenheit and a flammability rating of VW-1 as defined in UL62. The covering of jacketed cable will have a minimum rating of 289°Fahrenheit.

All circuits will conform to SAEJ1292. All circuits must be provided with low voltage over current protective devices.

All exposed electrical connections will be coated with “Z-Guard” to prevent corrosion.

**DIRECT GROUNDING STRAPS**

Direct grounding straps will be mounted to the following areas; frame to cab, frame to body and frame to pump enclosure.

All exposed electrical connections will be coated with "Z-Guard 8000" to prevent corrosion.

**EMI/RFI PROTECTION**

The apparatus will incorporate the latest designs in the electrical system with state of the art components to insure that radiated and conducted electromagnetic interference (EMI) and radio frequency interference (RFI) emissions are suppressed at the source.

The apparatus proposed will have the ability to operate in the environment typically found in fire ground operations with no adverse effects from EMI/RFI.

EMI/RFI susceptibility is controlled by utilizing components that are fully protected and wiring that utilizes shielding and loop back grounds where required. The apparatus will be bonded through wire braided ground straps. Relays and solenoids that are suspect to generating spurious electromagnetic radiation are diode protected to prevent transient voltage spikes.

In order to fully prevent the radio frequency interference the purchaser may be requested to provide a listing of the type, power output, and frequencies of all radio and bio medical equipment that is proposed to be used on the apparatus.

## 12 VOLT ELECTRICAL SYSTEM TESTING

The apparatus low voltage electrical system will be tested and certified by KME. The certification will be provided with the apparatus. All tests will be performed with air temperature between 0℉ and 100℉.

The following three (3) tests will be performed in order. Before each test, the batteries will be fully charged.

## TEST #1-RESERVE CAPACITY TEST

The engine will be started and kept running until the engine and engine compartment temperatures are stabilized at normal operating temperatures and the battery system is fully charged. The engine will be shut off and the minimum continuous electrical load will be activated for 10 minutes. All electrical loads will be turned off prior to attempting to restart the engine. The battery system will then be capable of restarting the engine. Failure to restart the engine will be considered a test failure.

## TEST #2-ALTERNATOR PERFORMANCE TEST AT IDLE

The minimum continuous electrical load will be activated with the engine running at idle speed. The engine temperature will be stabilized at normal operating temperature. The battery system will be tested to detect the presence of battery discharge current. The detection of battery discharge current will be considered a test failure.

## TEST #3-ALTERNATOR PERFORMANCE TEST AT FULL LOAD

The total continuous electrical load will be activated with the engine running up to the engine manufacturers governed speed. The test duration will be a minimum of 2 hours. Activation of the load management system will be permitted during this test. However, an alarm sounded due to excessive battery discharge, as detected by the system, or a system voltage of less than 11.7 volts DC for a 12 volt system, for more than 120 seconds, will be considered a test failure.

## LOW VOLTAGE ALARM TEST

Following completion of the preceding tests, the engine will be shut off. The total continuous electrical load will be activated and will continue to be applied until the excessive battery discharge alarm is activated.

The battery voltage will be measured at the battery terminals. With the load still applied, a reading of less than 11.7 volts will be considered a test failure. The battery system will then be able to restart the engine.

At time of delivery, documentation will be provided with the following information:

- Documentation of the electrical system performance test
- A written load analysis of the following;
- Nameplate rating of the alternator
- Alternator rating at idle while meeting the minimum continuous electrical load
- Each component load comprising the minimum continuous electrical load.
- Additional loads that, when added to the minimum continuous load, determine the total connected load.
- Each individual intermittent load.

## ELECTRICAL MANAGEMENT SYSTEM

A Class 1 ES-Key Electrical Management System will be utilized on the chassis for all functions applicable. The system will consist of the following components:

A Modem with a RS232 computer interface and standard telephone jack used to not only program the multiplex system but also serve as a factory direct gateway into the vehicle from any Class 1 multiplex authorized service facility.

A Universal System Manager (USM), which acts as the main controlling component of the multiplexing system will be provided and factory programmed to DOT, NFPA, SAE, KME's the apparatus manufacturer's and XYZ Fire Department specifications. The programming will be done by KME's engineering department. The ES-Key system installation will comply with SAE J 551 requirements regarding Electromagnetic and Radio Frequency interference (EMI, RFI), as well as utilize components and wiring practices that insure the system is protected against corrosion, excessive temperatures, water, excessive physical, and vibration damage by any equipment installed on the vehicle at the time of delivery.

A series of Multiplexing Input/Output Modules will be installed. The Input/Output modules will permit the multiplexing system to reduce the amount of wiring and components used as compared to non-multiplexed apparatus. These modules will vary in I/O configuration, be waterproof allowing installation outside of enclosed areas and will possess individual output internal circuit protection. The modules will also have three status indicators visible from a service persons vantage point that will indicate the status of the module. In the event a load requires more than 7.5 AMPS of operating current, the module will activate a simple relay circuit integral to any of the 3 dillbox assemblies installed in the cab.

A Class-1 four (4) line display will serve as an informational, status and diagnostic view panel for the vehicles electrical system.

## INTERLOCK INTERFACE MODULE

A Vocation Module, which is the interface between the multiplexing system and the pump system will be provided. This module will serve as the interface between the operator, engine, transmission and pumping system. The module will be installed under the driver's side dash, in a sealed enclosure that will possess green indicating LED's that will indicate to service personnel the interlock state of the apparatus. In the event of a multiplexing error involving pump operation can be activated to ensure reliable pumping operations at ALL times. In addition to controlling pump function, this vocation module will be able to provide automatic and/or manual activation of engine “Fast Idle”, to maintain adequate alternator output and thus, chassis voltage.

## CHASSIS DIAGNOSTICS SYSTEM

Diagnostic ports will be accessible while standing on the ground and located inside the driver's side door left of the steering column. The diagnostic panel will allow diagnostic tools such as computers to connect to various vehicle systems for improved troubleshooting providing a lower cost of ownership. Diagnostic switches will allow engine and ABS systems to provide blink codes should a problem exist.

The diagnostic system will include the following:

- Engine diagnostic port
- Transmission and ABS diagnostic port
- Roll sensor diagnostic port (if applicable).

Additional diagnostic locations under the officer's side of the dash.

- Engine diagnostic switch (blink codes)
- ABS diagnostic switch (blink codes).

**VOLTAGE MONITOR SYSTEM**

A voltage monitoring system will be provided to indicate the status of the battery system connected to the vehicle's electrical load. The system will provide visual and audible warning when the system voltage is below or above optimum levels.

The alarm will activate if the system falls below 11.8 volts DC for more than two (2) minutes.

**INDICATOR LIGHT AND ALARM PROVE-OUT SYSTEM**

A system will be provided which automatically tests basic indicator lights and alarms located on the cab instrument panel.

**12 VOLT SEQUENCER**

A sequencer will be provided that automatically activates and deactivates vehicle loads in a preset sequence thereby protecting the alternator from power surges. This sequencer operation will allow a gradual increase or decrease in alternator output, rather than loading or dumping the entire 12 volt load to prolong the life of the alternator.

Emergency light sequencing will operate in conjunction with the emergency master light switch. When the emergency master switch is activated, the emergency lights will be activated one by one at half second intervals. Sequenced emergency light switch indicators will flash while waiting for activation.

When the emergency master switch is deactivated, the sequencer will deactivate the warning light loads in the reverse order.

Rear of cab Air-Conditioning and Heat will be load managed.

**ELECTRICAL HARNESS REQUIREMENT**

To ensure dependability, all 12-volt wiring harnesses installed by KME will conform to the following specifications:

- SAE J 1128 - Low tension primary cable
- SAE J 1292 - Automobile, truck, truck-tractor, trailer and motor coach wiring
- SAE J 163 - Low tension wiring and cable terminals and splice clips
- SAE J 2202 - Heavy duty wiring systems for on-highway trucks
- NFPA 1901 - Standard for automotive fire apparatus
- FMVSS 302 - Flammability of interior materials for passenger cars, multipurpose passenger vehicles, trucks and buses
- SAE J 1939 - Serial communications protocol
- SAE J 2030 - Heavy-duty electrical connector performance standard
- SAE J 2223 - Connections for on board vehicle electrical wiring harnesses
- NEC - National Electrical Code
- SAE J 561 - Electrical terminals - Eyelet and spade type
- SAE J 928 - Electrical terminals - Pin and receptacle type A.

For increased reliability and harness integrity, harnesses will be routed throughout the cab and chassis in a manner which allows the harnessing to be laid into its mounting location. Routing of harnessing which requires pulling of wires through tubes is never allowed at KME.

Wiring will be run in loom or conduit where exposed, and have grommets or other edge protection where wires pass through metal. Wire colors will be integral to each wire insulator and run the entire length of each wire. Harnessing containing multiple wires and uses a single wire color for all wires will not be allowed. Function and number codes will be continuously imprinted on all wiring harness conductors at 3.00" intervals. All wiring installed between the cab and into doors will be protected by a wire conduit to protect the wiring. Exterior exposed wire connectors will be positive locking, and environmentally sealed to withstand elements such as temperature extremes, moisture and automotive fluids. Electrical wiring and equipment will be installed utilizing the following guidelines:

- All holes made in the roof will be caulked with silicon. Large fender washers, liberally caulked, will be used when fastening equipment to the underside of the cab roof.
- Any electrical component that is installed in an exposed area will be mounted in a manner that will not allow moisture to accumulate in it. Exposed area will be defined as any location outside of the cab or body.
- For low cost of ownership, electrical components designed to be removed for maintenance will be quickly accessible. For ease of use, a coil of wire will be provided behind the appliance to allow them to be pulled away from the mounting area for inspection and service work.
- Corrosion preventative compound will be applied to non-waterproof electrical connectors located outside of the cab or body. All non-waterproof connections will require this compound in the plug to prevent corrosion and for easy separation of the plug.
- Any lights containing non-waterproof sockets in a weather-exposed area will have corrosion preventative compound added to the socket terminal area.
- All electrical terminals in exposed areas will have protective coating applied completely over the metal portion of the terminal.
- Rubber coated metal clamps will be used to support wire harnessing and battery cables routed along the chassis frame rails.
- Heat shields will be used to protect harnessing in areas where high temperatures exist. Harnessing passing near the engine exhaust will be protected by a heat shield.
- Cab and crew cab harnessing will not be routed through enclosed metal tubing. Dedicated wire routing channels will be used to protect harnessing therefore improving the overall integrity of the vehicle electrical system. The design of the cab will allow for easy routing of additional wiring and easy access to existing wiring.
- All standard wiring entering or exiting the cab will be routed through sealed bulkhead connectors to protect against water intrusion into the cab.

**BATTERY CABLE INSTALLATION**

All 12-volt battery cables and battery cable harnessing installed by the apparatus manufacturer will conform to the following requirements:

- SAE J 1127 - Battery Cable
- SAE J 561 - Electrical terminals, eyelets and spade type
- SAE J 562 - Nonmetallic loom
- SAE J 836 A - Automotive metallurgical joining
- SAE J 1292 - Automotive truck, truck-tractor, trailer and motor coach wiring
- NFPA 1901 - Standard for automotive fire apparatus.

Battery cables and battery cable harnessing will be installed utilizing the following guidelines:

- Splices will not be allowed on battery cables or battery cable harnesses.
- For ease of identification and simplified use, battery cables will be color coded. All positive battery cables will be marked red in color. All negative battery cables will be black in color.
- For ease of identification, all positive battery cable isolated studs throughout the cab and chassis will be red in color.
- For increased reliability and reduced maintenance, all electrical buss bars located on the exterior of the apparatus will be coated to prevent corrosion.
- An operational test will be conducted to ensure that any equipment that is permanently attached to the electrical system is properly connected and in working order.

**ALTERNATOR**

The alternator will be Leece Neville Model 4962PA, 320 amp, serpentine belt driven unit. The installation will include an integral self-diagnostic regulator and rectifier for compact installation.

The alternator installation will be designed to provide maximum output at engine idle speed to meet the minimum continuous electrical load of the apparatus as required.

**BATTERY SYSTEM**

Six (6) Exide # XHP-31D, maintenance free batteries will be provided. Each battery will be rated at 950 CCA at 0°F and will have a reserve capacity of 190 minutes.

Wiring for the batteries will be 4/0 welding type dual path starting cables for SAEJ541.

**BATTERY STORAGE**

Batteries will be securely mounted in fixed 3/16” GR50 steel trays located on each side of the chassis frame. Complete access will be provided when the cab is fully tilted. Batteries will be mounted on non-corrosive matting material.

The battery tray will be able to withstand a longitudinal acceleration of -46.5g at 0.246 seconds in accordance to SAE J211 standards using a channel frequency class 600 filter. Testing will be performed at and verified by a third party testing and evaluation center.

**BATTERY DISCONNECT SWITCH**

The chassis batteries will be wired in parallel to a single 12 volt electrical system, controlled through a heavy duty, rotary type, master disconnect switch. The master disconnect switch will be located within easy access of the driver upon entering or exiting the cab.

**BATTERY JUMPER STUDS**

A set of Cole Hersee battery jumper studs, model #46210-02 (red) and #46210-03 (black) will be provided to allow the battery system to be jump started or charged from an external source. The studs will be located on the bottom of the battery box on the driver's side of the chassis. Each stud will be equipped with both a rubber protector cap and a 2” square non-conductive plate to prevent accidental shorting.

**120 VOLT SHORELINE CONNECTION - "SUPER" AUTO EJECT**

One (1) Kussmaul "Super" Auto Eject model 091-55-20-120, automatic, 120 volt, 20 amp shoreline disconnect will be provided for the on board, 110 volt battery charging systems.

The disconnect will be equipped with a NEMA 5-20 P male receptacle, which will automatically eject the shoreline when the vehicle starter is energized. A label will be provided indicating voltage and amperage ratings.

**SHORELINE POWER INLET PLATE**

A shoreline power receptacle information plate will be permanently affixed at or near the power inlet. The plate will indicate the following;

- Type of Line Voltage
- Current Rating in Amps Power Inlet Type (DC or AC).

The Kussmaul auto-eject connection will be equipped with a Yellow or other Department directed color weatherproof cover.

The shoreline receptacle will be located in the area directly adjacent to the driver's side cab door.

**BATTERY CHARGER / AIR COMPRESSOR SYSTEM**

A Kussmaul model #091-187-12-REMOTE, "Auto Charge 1200" high output, fully automatic battery charger will be provided for maintaining the vehicle battery system. Unique electronic sensing circuits sense the true battery voltage while eliminating the need for external sense wires. Output current will be 40 amperes @ 12 volt DC.

A Kussmaul 091-9HP air compressor will maintain the air pressure in the chassis air brake system while the vehicle is not in use. The air compressor will have a rated input at 120 volts AC @ 3.5 amps and an output of 1.4 CFM with a 125 psi max output.

A LED bar graph display will be located near the shoreline connection to monitor the battery status.

**OUTLET STRIP**

One (1) 3' long outlet strip will be installed on the rear of the doghouse. Each outlet strip will have four (4) duplex household receptacles.

**EMERGENCY SWITCHES**

A switch control console will be provided in the center dash panel between the driver's and officer's position. This console will separate the emergency / auxiliary electrical functions from the regular chassis functions. Eight (8) Class One model # SPS programmable touch pad type switches with integral indicator lights will be provided.

A master switch will be provided, which will allow pre-setting of emergency light switch and will have a red integral indicator light. A primary emergency lighting switch will be provided, next to the master switch, along with a total of six (6) load manageable emergency switches. The last remaining switch will be a ground light switch. All switches, (other than the master switch), will have switch function labeling and an amber integral indicator light.

In addition to the standard switches, four (4) Class One model # SPS programmable touch pad type switches with integral indicator lights will be provided, allowing control of up to eight functions. All switches will have switch function labeling and an amber integral indicator light. This switch panel shall be located near the officer and shall allow duplicate control of the warning lights, brow lights and body scene lights.

**"LED" CAB INTERIOR LIGHTING**

Four (4) Akron 8080-8000-13 interior LED combination red/white dome lights will be furnished in the cab, two (2) in the forward section and two (2) in the rear crew section. Each dome light will have an integral selector switch. Each dome light will also activate when the respective, adjacent cab door is opened.

**"DO NOT MOVE APPARATUS" WARNING LIGHT**

A 3/4" red flashing warning light with an integral audible alarm will be functionally located in the cab to signal when an unsafe condition is present; such as an open cab or body compartment door, an extended ladder rack, a deployed stabilizer, an extended light tower or any other device that may be opened, extended or deployed and might cause damage to the apparatus if it is moved.

This light will be activated through the parking brake switch to signal when the parking brake is released. This light will be labeled "DO NOT MOVE TRUCK".

**12 VOLT POWER PORT**

One (1) 12 volt power port accessory outlet(s) will be installed in the cab of the truck for the fire departments accessory devices. The lighter(s) will be located near the driver for devices such as cellular phones.

**12 VOLT POWER PORT**

One (1) 12 volt power port accessory outlet(s) will be installed in the cab of the truck for the fire departments accessory devices. The lighter(s) will be located as directed near the officer's seating position for devices such as cellular phones.

**12 VOLT ACCESSORY CIRCUIT - CAB DASH**

One (1) dedicated circuit; 12 volt, 40 Amp, power and ground on 3/8 stud and fused at battery will be provided in the cab dash. The circuit will be for future installation of radios or accessories.

**12 VOLT ACCESSORY CIRCUIT - CREW CAB AREA**

A dedicated 12 volt power and ground circuit will be provided behind the officer's seat as required. The circuit will be for future installation of radios or accessories.

**HEADLIGHTS CLUSTER**

Two (2) quad, halogen headlight modules with a bright finish bezel will be furnished, one (1) each side, on the front of the cab. Each head light module will incorporate an individual low beam and a high beam headlight. High beam actuation will be controlled on the turn signal lever.

**DAYTIME RUNNING LIGHTS**

The chassis head lights will have integrated circuitry to actuate the low beam headlights at a maximum of 80 percent of capacity whenever the chassis engine is running.

The daytime running lights will be interlocked with the parking brake.

**UPPER LIGHT MODULE**

Two (2) Whelen 60F000RR 60 watt halogen flashing light heads will be provided, one (1) in each side dual light module, above the headlights, in matching chrome plated bezels. The lens color will be red unless otherwise specified.

The lights will be wired through the AFM560 flasher unit.

An individual control switch will be provided on the cab switch console, which will be wired through the load management system to prevent excessive amperage draw.

The lights noted above will be provided in addition to the NFPA required, minimum optical warning light package.

The NFPA required, Zone "A" lower warning lights will be incorporated into each side dual light module noted above.

**ARROW TURN SIGNALS**

Two (2) Whelen 60A00TAR arrow shaped, amber LED turn signals will be provided in chrome plated housings, mounted one (1) each side between the windshield and the dual light modules.

**DOT MARKER LIGHTS AND REFLECTORS**

Five (5) DOT approved Whelen (or equal) Light Emitting Diode (LED) cab marker lamps will mounted on the top front edge of the cab roof.

Amber LED marker lights with integral reflectors will be provided on the side of the cab adjacent to the driver's door, one (1) each side.

Truck-Lite Model # 18 red LED marker lights with integral reflectors will be provided at the lower side rear, one (1) each side.

Truck-Lite # 60115Y yellow LED side marker and turn lights will be provided on the apparatus lower side, forward of rear axle, one (1) each side.

Truck-Lite Model #19 red LED clearance lights will be provided on the apparatus rear upper, one (1) each side at the outermost practical location.

Truck-Lite Model # 33740R LED 3-lamp identification bar will be provided on the apparatus rear center. The lights will be red in color.

Truck-Lite # 98034Y yellow reflectors will be provided on the apparatus body lower side, as far forward and low as practical, one (1) each side if the apparatus is 30' long or longer.

Truck-Lite # 98034R red reflectors will be provided on the apparatus rear, one (1) each side at the outermost practical location.

**LED LICENSE PLATE LIGHT - REAR**

One (1) Truck-Lite model #15055 LED license plate light will be provided above the mounting position of the license plate. The light will be clear in color and will have a chrome finish.

**TAIL, STOP, TURN AND BACK-UP LIGHTS**

Two (2) Whelen 600 series, 4-1/8" x 6-1/2", LED red combination tail and stop lights, will be mounted one each side at the rear of the body.

Two (2) Whelen 600 series, 4-1/8" x 6-1/2", LED amber arrow turn signal lights, will be mounted one each side, on a vertical plane with the tail/stop lights.

Two (2) Whelen 600 series, 4-1/8" x 6-1/2", LED white back-up lights, will be mounted one each side on a vertical plane with the turn/tail/stop signals. These lights will activate when the transmission is placed in reverse gear.

Two (2) Whelen PLAST4V mounting flanges, installed one (1) on each side, will be provided to mount the lights described above in one common mounting flange. The fourth opening will be for the lower rear warning lights.

**CAB STEP LIGHTS**

Chrome plated Whelen model # 0AC0EDCR, shielded LED chassis step lights will be provided and controlled with marker light actuation. Step lights will be located to properly illuminate all chassis access steps and walkway areas.

**BODY STEP LIGHTS**

Chrome plated Whelen model # 0AC0EDCR, shielded LED body step lights will be provided and controlled with marker light actuation. Step lights will be located to properly illuminate all chassis access steps and walkway areas.

**DUNNAGE AREA LIGHTING**

Two (2) chrome plated Whelen model # 0AC0EDCR, shielded LED lights will be provided in the dunnage area to provide adequate illumination of this area.

**SCENE LIGHTS - BEHIND FRONT CAB DOORS**

Two (2) Whelen # 9SC0ENZR super LED scene lights will be provided, one on each side of the cab, directly behind the front cab entrance door in a chrome plated flange. The scene lights will be controlled by a rocker switch in the master warning light switch console. All scene lights will be wired through the load management system.

**SCENE LIGHTS - REAR OF BODY**

Two (2) Whelen # 9SC0ENZR super LED scene lights will be provided, one on each side of the rear body panel in a chrome plated flange. The scene lights will be controlled by a rocker switch in the master warning light switch console. All scene lights will be wired through the load management system.

**SCENE LIGHTS - SIDE OF BODY, FRONT**

Two (2) Whelen # 9SC0ENZR super LED scene lights will be provided. The scene lights will be mounted one each side, to the front, on the upper side body panel in a chrome plated flange. The scene lights will be controlled by a rocker switch in the master warning light switch console. All scene lights will be wired through the load management system.

**SCENE LIGHTS - SIDE OF BODY, REAR**

Two (2) Whelen # 9SC0ENZR super LED scene lights will be provided. The scene lights will be mounted one each side, to the rear, on the upper side body panel in a chrome plated flange. The scene lights will be controlled by a rocker switch in the master warning light switch console. All scene lights will be wired through the load management system.

**REAR SCENE LIGHTS - ADDITIONAL ACTIVATION**

In addition to the cab mounted switch for the rear scene lights, the rear scene lights will illuminate when the transmission is placed in reverse gear and the apparatus is operating as an emergency vehicle (Primary Warning switch on).

**GROUND LIGHTS - CAB**

One (1) Truck Lite Model 44 LED ground light will be provided under each side cab door entrance step, four (4) total. The ground lights will turn on automatically with each respective door jamb switch and also by a master ground light switch in the warning light switch console.

Each light will illuminate an area at a minimum 30" outward from the edge of the vehicle. The rear crew door ground lights will be positioned at an angle rearward to provide illumination at the pump panel and the front of the body work areas.

**GROUND LIGHTS - FRONT BUMPER**

One (1) Truck Lite Model 44 LED ground light will be provided under each side of the front bumper facing forward, two (2) total. The ground lights will be activated by a master ground light switch in the cab and will be wired through the load management system.

**GROUND LIGHTS - FRONT BODY**

One (1) Truck Lite Model 44 LED ground light will be provided under each front body corner, two (2) total. The ground lights will be activated by a master ground light switch in the cab and will be wired through the load management system.

**GROUND LIGHTS - REAR**

One (1) Truck Lite Model 44 LED ground light will be provided under each rear body corner, two (2) total. The ground lights will be activated by a master ground light switch in the cab and will be wired through the load management system.

**GROUND LIGHT SWITCHING**

The cab and body ground lights will activate by engaging the parking brake.

**ROOF MOUNT 150W LED BROW LIGHTS - ABOVE WINDSHIELD**

Two (2) Whelen Pioneer Plus # PCP2 super LED roof mount flood/spot lights will be provided and installed. The mounting bracket will attach to the lamp head and be machined to conform to the roof radius.

Each lamp head will have two (2) dual stacked white LED modules and will draw 12 amps and generate 14,000 lumens. Each lamp head will incorporate an adjustable downward angle to maximize the light effectiveness.

The lamp head and brackets will be powder coated white.

The Whelen brow mounted flood lights will be located one (1) each side above the windshield.

**TELESCOPING 75W WHELEN LED SPOT LIGHTS – REAR OF CAB**

Two (2) Whelen model #PSP1P1, 75 watt, 12 volt led spot lights will be installed, one (1) each side, on the rear of the cab, each using a Fire Research telescoping pole.

Each lamp head will draw 6 amps and generate 7,000 lumens. Each light will be switched at the light head.

**REAR OF CAB LIGHTS MASTER POWER SWITCH**

A master power switch will be provided in the cab warning light switch console to turn the rear of cab lights on and off.

**LIGHTS ABOVE WINDSHIELD MASTER POWER SWITCH**

A master power switch will be provided in the cab warning light switch console to turn the lights above windshield on and off.

****** BODY ELECTRICAL SYSTEM ******

**12 VOLT BODY ELECTRICAL SYSTEM**

All electrical lines in the body will be protected by automatic circuit breakers, conveniently located to permit ease of service. Flashers, heavy solenoids and other major electrical controls will be located in a central area near the circuit breakers.

All lines will be color and function coded every 3", easy to identify, oversized for the intended loads and installed in accordance with a detailed diagram. A complete wiring diagram will be supplied with the apparatus.

Wiring will be carefully protected from weather elements and snagging. Heavy duty loom will be used for the entire length. Grommets will be utilized where wiring passes through panels.

In order to minimize the risk of heat damage, wires run in the engine compartment area will be carefully installed and suitably protected by the installation of heat resistant shielded loom.

All electrical equipment will be installed to conform to the latest federal standards as outlined in NFPA 1901.

**BODY ELECTRICAL JUNCTION COMPARTMENT**

A weather resistant electric junction compartment will be provided in the left or right side lower front compartment. This compartment will be recessed through the inside rear wall of the compartment to provide an easily accessible enclosure to house all of the body wiring junction points, terminal strips, solenoids, etc. The design of this compartment will not decrease the storage capacity area of the compartment in which it is located. A removable panel will be provided for access to this compartment.

**PUMP ENCLOSURE WORK LIGHTS**

Two (2) Peterson model #M391 lights will be provided inside the pump enclosure providing a minimum of 20 candlepower illumination. Each light will have their own independent switch incorporated into the light head.

**ENGINE COMPARTMENT WORK LIGHTS**

Two (2) Peterson model #M391 lights will be provided inside the engine enclosure that will provide a minimum of 20 candlepower illumination. Each light will have their own independent switch incorporated into the light head.

**AMDOR LUMA BAR TRACK MOUNTED COMPARTMENT LIGHTS - LED**

Each individual, equipment storage compartment will be equipped with the AMDOR Luma Bar LED light fixture mounted one each side of the forward (and rear) vertical door frame.

**NFPA AUDIBLE AND LIGHTING WARNING PACKAGE**

The following warning light package will include all of the minimum warning light and actuation requirements for the current revision of the NFPA 1901 Fire Apparatus Standard. The lighting as specified will meet the requirements for both "Clearing Right of Way" and "Blocking Right of Way" as noted.

**LIGHT PACKAGE ACTUATION CONTROLS**

The entire warning light package will be actuated with a single warning light switch located on the cab switch panel. The wiring for the warning light package will engage all of the lights required for "Clearing Right of Way" mode when the vehicle parking brake is not engaged. An automatic control system will be provided to switch the warning lights to the "Blocking Right of Way" mode when the vehicle parking brake is engaged.

**UPPER LEVEL LIGHTING - WHELEN**

**NFPA ZONE A, UPPER**

A Whelen # FN72QLED "Edge Freedom", 72" cab roof warning lightbar will be furnished and rigidly mounted on top of the cab roof. The lightbar will be equipped with the following:

- Two Front Corner Red Linear LED's
- Two Red Forward Facing Linear LED's
- Two White Forward Facing Linear LED's
- Two Red End Linear LED's.

The forward facing clear LED flashers will be disabled automatically for the "Blocking Right of Way" mode.

The Freedom light bar will be equipped with one (1) pair(s) of # FLDRR red LED warning lights.

The Freedom light bar will be equipped with one (1) pair(s) of # FLDCC white LED warning lights.

**NFPA ZONE C, UPPER**

Two (2) surface mounted Whelen 90RR5FRR, 900 series super LED light heads will be furnished and mounted one (1) each side on the upper rear face of the body, facing rear. Each upper rear LED flashing light head will be equipped with a red lens and chrome plated flange.

**NFPA ZONES B & D REAR, UPPER**

Two (2) surface mounted Whelen 90RR5FRR, 900 series LED light heads will be furnished and mounted one (1) each side on the upper side face, towards the rear of the body, facing to each side of the unit. Each upper rear LED light head will be equipped with a red lens and chrome plated flange.

**NFPA ZONES B & D FRONT, UPPER**

Two (2) surface mounted Whelen 90RR5FRR, 900 series super LED light heads will be furnished and mounted one (1) each side on the upper side face, towards the front of the body, facing to each side of the unit. Each upper front LED light head will be equipped with a red lens and chrome plated flange.

**LOWER LEVEL LIGHTING - WHELEN**

**NFPA ZONE A, LOWER**

Two (2) Whelen # 60R02FRR linear super LED light heads will be provided and installed one (1) each side. Each light will be equipped with a red lens and chrome plated mounting flange.

The lower Zone A warning lights will be mounted in the custom chassis headlight bezels.

**NFPA ZONE C, LOWER**

Two (2) Whelen # 60R02FRR linear LED light heads will be provided and installed one (1) each side directly below the DOT stop, tail, turn and backup lights. Each light will be equipped with a red lens and chrome plated mounting flange.

**NFPA ZONES B & D FRONT, LOWER**

Two (2) Whelen # 60R02FRR linear super LED light heads will be provided and installed one (1) each side. Each light will be equipped with a red lens and chrome plated mounting flange.

The lower Zone B & D warning lights will be mounted on the sides of the custom chassis front bumper.

**NFPA ZONES B & D MIDSHIP, LOWER**

Two (2) Whelen # 60R02FRR linear super LED light heads will be provided and installed one (1) each side. Each light will be equipped with a red lens and chrome plated mounting flange.

**NFPA ZONES B & D REAR, LOWER**

Two (2) Whelen # 60R02FRR linear super LED light heads will be provided and installed one (1) each side. Each light will be equipped with a red lens and chrome plated mounting flange.

**WARNING LIGHT SYSTEM CERTIFICATION**

The warning light system(s) specified above will not exceed a combined total amperage draw of 45 AMPS with all lights activated in either the "Clearing Right of Way" or the "Blocking Right of Way" mode.

The warning light system(s) will be certified by the light system manufacturer(s), to meet all of the requirements in the current revision of the NFPA 1901 Fire Apparatus Standard as noted in the General Requirements section of these specifications. The NFPA required "Certificate of Compliance" will be provided with the completed apparatus.

**ALTERNATING FLASHING HEADLIGHT SYSTEM**

An alternating flashing wig-wag system, wired to the apparatus headlights, will be installed. The wig-wag system will be individually switched at the master light console. The alternating flashing system will be automatically disabled during the "Blocking Right of Way" mode.

**TRAFFIC ADVISER WARNING LIGHT**

One (1) Whelen LED "Traffic Advisor", model TAL85 48", rear directional light will be installed on the rear of the body. The light will be equipped with eight (8) lamps. The directional light will be activated by a control module. The control module will be conveniently located near the driver's position. The rear directional light will be wired through the load management system of the unit.

**ELECTRIC HORN**

A single electric horn activated by the steering wheel horn button will be furnished.

**BACK-UP ALARM**

A Code 3, model # D450C, 87dBA back-up alarm, will be provided and installed at the rear of the apparatus under the tailboard. The back-up alarm will activate automatically when the transmission is placed in reverse gear and the ignition is "on".

**AIR HORNS**

Two (2) chrome plated air horns will be at the front of the vehicle. The air horns will be mounted in full compliance with NFPA-1901. The supply lines will be dual 1/4" lines with equal distance from each horn.

Both air horns will be recessed in the front bumper.

The air horn(s) will be controlled by a foot switch on the officer's side and the steering horn button on driver's side. An air horn/electric DOT horn selector switch will be furnished on the dash for the drivers steering horn button.

**ELECTRONIC SIREN AND SPEAKER**

One (1) Whelen # 295HFS2, 100 watt electronic siren will be provided featuring: flush mount remote control head recessed in center dash panel as space allows, "Si-Test" self diagnostic feature, six (6) function siren, radio repeat and public address.

The electronic siren and speaker will meet the NFPA required SAE certification to ensure compatibility between the siren and speaker.

One (1) Whelen, model # SA122FMP polished aluminum siren speakers will be provided, recessed in the front bumper and wired to the electronic siren.

**FEDERAL Q2B MECHANICAL SIREN**

One (1) Federal Model #Q2B mechanical siren will be provided to provide audible warning.

The Q2-B siren will be fully-recessed into the bumper on the driver's side. The siren will be recessed so the front grille portion of the siren is flush with the front of the bumper.

Two (2) floor mounted foot switches will be provided, one (1) for the officer and one (1) for the driver. A siren brake button will be provided near the driver's position.

A second push button siren brake switch will be provided on the cab dash near the officers seating position.

****** PUMP AND PLUMBING ******

**PUMP**

- **HALE QMAX-150**
- **1500 G.P.M.**
- **Single Stage**

The pump must deliver the percentage of rated capacity at the pressure listed below:

- 100% of rated capacity at 150 P.S.I. net pump pressure
- 100% of rated capacity at 165 P.S.I. net pump pressure
- 70% of rated capacity at 200 P.S.I. net pump pressure
- 50% of rated capacity at 250 P.S.I. net pump pressure.

**PUMP ASSEMBLY**

The pump will be of a size and design to mount on the chassis rails of commercial and custom truck chassis, and have the capacity of 1500 gallons per minute (U.S. GPM), NFPA-1901 rated performance.

**PUMP CONSTRUCTION**

The entire pump will be manufactured and tested at the pump manufacturer's factory.

The pump will be driven by a drive line from the truck transmission. The engine will provide sufficient horsepower and RPM to enable the pump to meet and exceed its rated performance.

The entire pump, both suction and discharge passages, will be hydrostatically tested to a pressure of 600 PSI. The pump will be fully tested at the pump manufacturer's factory to performance specs as outlined by the latest NFPA-1901. Pump will be free from objectionable pulsation and vibration.

The pump body and related parts will be of fine grain alloy cast iron with a minimum tensile strength of 30,000 PSI. All moving parts in contact with water will be of high quality bronze or stainless steel. Pumps utilizing castings made of lower tensile strength cast iron are not acceptable.

Pump body will be horizontally split, on a single plane in two sections for easy removal of entire impeller assembly including wear rings and bearings from beneath the pump without disturbing piping or the mounting of the pump in chassis.

**PUMP SHAFT**

Pump shaft to be rigidly supported by three bearings for minimum deflection. One high lead bronze sleeve bearing will be located immediately adjacent to the impeller (on side opposite the gearbox). The sleeve bearing is to be lubricated by a force fed, automatic oil lubricated design, pressure balanced to exclude foreign material.

The pump shaft will be heat-treated, electric furnace, corrosion resistant stainless steel to be super-finished under packing with galvanic corrosion (zinc foil separators in packing) protection for longer shaft life. Pump shaft must be sealed with double-lip oil seal to keep road dirt and water out of gearbox.

**PUMP IMPELLER**

The pump will have one double suction impeller. The pump body will have two opposed discharge volute cutwaters to eliminate radial unbalance. (No exceptions)

Pump impeller will be hard, fine grain bronze of the mixed flow design; accurately machined and individually balanced. The vanes of the impeller intake eyes will be of sufficient size and design to provide ample reserve capacity utilizing minimum horsepower.

Impeller clearance rings will be bronze, easily renewable without replacing impeller or pump volute body, and of wrap-around double labyrinth design for maximum efficiency.

**MECHANICAL SHAFT SEAL**

The midship pump will be equipped with a high quality, spring loaded, self-adjusting mechanical seal capable of providing a positive seal to atmosphere under all pumping conditions. This positive seal to atmosphere must be achievable under vacuum conditions up to 26 Hg (draft) or positive suction pressures up to 250 PSI.

The mechanical seal assembly will be 2 inches in diameter and consists of a carbon sealing ring, stainless steel coil spring, Viton rubber boot, and a tungsten carbide seat with a Teflon backup seal provided.

Only one (1) mechanical seal will be required, located on the first stage suction (inboard) side of the pump and be designed to be compatible with a one piece pump shaft. A continuous cooling flow of water from the pump will be directed through the seal chamber when the pump is in operation.

**PUMP DRIVE UNIT**

The drive unit will be completely assembled and tested at the pump manufacturer's factory.

Pump drive unit will be of sufficient size to withstand up to 16,000 lbs. ft. of torque of the engine in both road and pump operating conditions. The drive unit will be designed of ample capacity for lubrication reserve and to maintain the proper operating temperature.

The gearbox drive shafts will be of heat treated chrome nickel steel and at least 2-3/4 inches in diameter on both the input and output drive shafts. They will withstand the full torque of the engine in both road and pump operating conditions.

All gears, both drive and pump, will be of the highest quality electric furnace chrome nickel steel. Bores will be ground to size and teeth integrated, chrome-shaven and hardened, to give an extremely accurate gear for long life, smooth, quiet running and higher load carrying capability. An accurately cut spur design will be provided to eliminate all possible end thrust.

**PUMP RATIO**

The pump ratio will be selected by the apparatus manufacturer to give maximum performance with the engine and transmission selected.

The manufacturer will supply at time of delivery copies of the pump manufacturer's certification of hydrostatic testing, the engine manufacturer's current certified brake horsepower curve.

**PUMP SHIFT CONTROL**

The drive unit will be equipped with a power shift. The shifting mechanism will be a heat treated, hard anodized aluminum power cylinder with stainless steel shaft. An air operated in-cab control for rapid shift will be provided that locks in road or pump, with a neutral position for use when manual override is required.

**MAIN PUMP - PUMP SHIFT INDICATOR LIGHTS**

For automatic transmissions, three (3) green warning lights will be provided to indicate to the operator(s) when the pump has completed the shift for Road to Pump position. Two (2) green lights to be located in the truck driving compartment and one (1) green light on pump operator's panel adjacent to the throttle control. For manual transmissions, one (1) green warning light will be provided for the driving compartment. All lights to have appropriate identification/instruction plates.

**TRANSMISSION LOCK**

The automatic transmission furnished in the chassis will have a lock-up assembly which brings the transmission to direct drive and prevents the transmission from shifting gears while in the pumping mode.

**BRAKING SYSTEM**

A positive braking system will be provided to prevent vehicle movement during pumping operations. The air brakes furnished must satisfy this requirement.

**MAIN PUMP MOUNTS**

Extra heavy duty pump mounting brackets will be furnished. These will be bolted to the frame rails in such a position to perfectly align the pump so that the angular velocity of the drive line joints will be the same on each end of the drive shaft. This will assure full capacity performance with a minimum of vibration. Mounting hardware will utilize Grade 8 bolts.

Pumps which are not mounted directly to the frame will not be considered. Under no circumstance shall the pump function as a frame cross member.

******* PRESSURE CONTROL & ACCESSORIES *******

**CLASS ONE "TPG+" PRESSURE GOVERNOR**

The apparatus will be equipped with a Class1 “Total Pressure Governor Plus” (TPG+) that is connected to the Engine Control Module (ECM) mounted on the engine. The “TPG+” will operate as a pressure sensor (regulating) governor (PSG) utilizing the engines J1939 data for optimal resolution and response when supported by the engine manufacturer. If J-1939 engine control is not supported, then analog remote throttle control will be provided by the “TPG+”. The “TPG+” will function as a Master Pump Discharge and Intake Gauge.

The TPG+ will utilize control algorithms that minimize pressure spikes during low or erratic water supply situations. The "TPG+" will be backwards compatible to any engine that supplies J1939 RPM, Temperature and Oil Pressure information providing the ability to maintain a consistent fleet fire-fighting capability and reduce operator cross training and confusion.

The "TPG+" will have the ability to use either a 300 PSI or a 600 PSI discharge pressure transducer and a 300 PSI intake pressure transducer. PSG system diagnostics will be built in and accessible by technicians. Programmable presets for RPM and Pressure settings will be easily configurable. The straightforward menu structure will allow the "TPG+" configuration to match existing apparatus operation as closely as possible.

The "TPG+" will also include indication of engine RPM, system voltage, engine oil pressure and engine /transmission temperature with audible alarm output for all. The "TPG+" uses the J1939 data bus for engine information, requiring no additional sensors to be installed. The TPG+ will monitor and display pump and engine hours. The "TPG +" will use J1939 broadcast warnings for the alarm as a standard and allow the "user" to select warning values if "SOPs" dictate.

The pressure governor, monitoring and master pressure display will be programmed to interface with a specific engine.

**AKRON INTAKE RELIEF VALVE**

An Akron Model 59 intake relief valve system will be plumbed on the suction side of the pump to comply fully with NFPA-1901 requirements. Excess pressures will be plumbed to discharge water under the pump enclosure away from the pump operator.

**PUMP CERTIFICATION**

The pump will be third party performance tested to meet the requirements of NFPA-1901. To ensure top quality and integrity, the test company will be Underwriter's Laboratories (UL).

**PRIMING SYSTEM**

The priming pump will be a 12-volt Hale model ESP Oil-Less, positive displacement vane type primer, electrically driven. One priming control will open the priming valve and start the priming motor. The primer will be capable of priming without the use of primer oil. The primer will be connected to the power source with a 300 amp fusible link.

The Hale primer will be activated by a manual valve located on the pump operator's panel. The valve will activate the primer motor, which will create a vacuum. Valve actuation may be accomplished while the main pump is operational, if necessary to assure complete prime.

**PRIMING PUMP**

The priming pump will be a Trident air primer system. A push in primer handle will open the priming valve and prime the pump.

**MASTER DRAIN VALVE**

A rotary type, 12 port master drain valve will be provided and controlled at the lower portion of the side pump panel. The valve will be located in pump compartment lower than the main body and connected in such a manner as to allow complete water drainage of the pump body and all required accessories. Water will be drained below the apparatus body and away from the pump operator.

**INDIVIDUAL BLEEDERS AND DRAINS**

All lines will drain through the master drain valve or will be equipped with individual drain valves, easily accessible and labeled.

One (1) individual "Innovative Control" lift up drain valve will be furnished for each 1-1/2" or larger discharge port and each 2-1/2" gated auxiliary suction.

Drain/bleeder valves will be located at the bottom of the side pump module panels.

All drains and bleeders will discharge below the running boards.

**SYNFLEX SUCTION, DISCHARGE, PRESSURE AND CONTROL LINES**

Small lines within the pump enclosure will be constructed from Synflex hose. Uses include, but are not limited to such lines as priming control, gauge lines, drain lines, air control valves, pump shift, supplemental cooling, foam flush and air bleeder valves.

**THERMAL RELIEF VALVE**

A Hale Model TRV120 Thermal Relief Valve will be provided on the pump. If water temperature in the pump exceeds 120 degrees Fahrenheit, the thermal relief valve will automatically open and discharge pump water to the atmosphere, through a 3/8" discharge line, routed below the pump module. The thermal relief valve will automatically close when the water temperature is lowered.

**PUMP MODULE**

The pump module will be a self-supported structure mounted independently from the body and chassis cab. The design must allow normal frame deflection without imposing stress on the pump module structure or side running boards. The pump module will be securely mounted to the chassis frame rails.

The pump module will be a welded frame work utilizing structural steel components properly braced to withstand the rigors of chassis frame flex.

**DUNNAGE AREA**

A dunnage area will be provided above the pump enclosure for equipment mounting and storage. This area will be furnished with a removable 3/16" aluminum tread plate floor and will be enclosed on the sides.

NOTE: The size of this storage area may vary when top mounted crosslays, booster reel(s), etc., are specified and located in this area.

******* PUMP SUCTIONS & AUXILIARY INLETS *******

**SUCTION INLETS**

Two (2) 6" N.S.T. suction inlets will be provided, one on the driver side and one on the officer side pump panel. A removable strainer will be installed on each inlet.

**INTAKE BUTTERFLY VALVE - ELECTRIC OPERATED**

The fire pump will be fitted with a Hale Master Intake Valve (MIV), on the driver side main suction inlet. The valve will be mounted between the suction tube extension and the suction tube, and will be recessed behind the operator's panel. The valve body and all related components that are in contact with water will be manufactured of fine grained, corrosion resistant bronze. The valve will have a bore of 6.40". The valve will incorporate a pressure relief valve, set at the pump manufacturer's facility to a rating of 125 PSI. The pressure relief valve will provide protection for the suction hose even with the valve in the closed position. The valve will incorporate NFPA-1901 compliant, large diameter hose air bleed valve, controlled at the operator's panel.

The valve will be operated by a twelve (12) volt DC motor, as standard. It will also incorporate a hand wheel control manual override, mounted at the suction inlet. The electric control will incorporate a placard with status lights to indicate whether the valve is in the closed, open or throttled position. The valve will not be able to move from fully open to fully closed in under three (3) seconds, in compliance with NFPA-1901.

**PUMP SUCTION ENDS**

The main pump suction inlets will be furnished with a short suction end, terminating with only the suction threads protruding through the side panel to minimize the distance an exterior appliance protrudes beyond the pump panel.

One (1) 6" NST chrome plated long handle pressure vented cap will be installed on the main inlet of the pump.

**AUXILIARY SIDE SUCTION(S)**

One (1) 2-1/2" auxiliary suction will be provided at the driver side pump panel, to the rear of the main inlet. The 2-1/2" auxiliary suction will terminate with a removable strainer, chrome plated 2-1/2" NST female swivel with a chrome plated plug and retaining chain.

A 2 1/2" Akron # 8800 series full flow, stainless steel ball valve will be provided for the driver side rear auxiliary suction.

A 1/4 turn swing control handle will be provide on the driver side rear auxiliary suction valve

All side gated inlet valves will be recess mounted behind the side pump panels or body panels. (No Exceptions)

**TANK TO PUMP**

One (1) 3" tank to pump line will be piped through the front bulkhead of the tank with a 90 degree elbow down into the tank sump. This line will be plumbed directly into the rear of the pump suction manifold for maximum efficiency.

A check valve will be provided to prevent accidental pressurization of the water tank through the pump connection. Connection from the valve to the tank will be made by using a non-collapsible flexible rubber hose.

A 3" Akron # 8800 series full flow, stainless steel ball valve will be provided between the pump suction manifold and the water tank.

A push/pull control handle will be located on the operator's panel with function plate.

**TANK FILL**

One (1) 2" gated full flow pump to tank refill line controlled at the pump panel will be provided. A deflector shield inside the tank will be furnished. Tank fill plumbing will utilize 2" high pressure hose for tank connection to accommodate flexing between components. (NO EXCEPTIONS)

A 2" Akron, # 8800 series, full flow, stainless steel ball valve will be provided between the pump discharge manifold and the water tank.

A push/pull control handle will be located on the operator's panel with function plate.

******* DISCHARGES & ACCESSORIES -SIDE MOUNT *******

**DRIVER'S SIDE MAIN DISCHARGE #1**

A discharge will be provided and located at the driver's side pump panel. The driver's side discharges # 1 will terminate with NST threads, through the left panel above the main pump intake.

The main pump discharge will be plumbed directly from the pump discharge manifold utilizing direct connect discharge valve flanges.

A 2 1/2" Akron, # 8800 series, full flow, stainless steel ball valve will be provided for the driver's side # 1 discharge. The valve will be equipped with the Akron "Tork-Lok" feature.

The discharge valve will be equipped with integral 2 1/2" NST, 30 degree, chrome plated elbow.

The driver's side #1 discharge cap provided as standard equipment will be deleted.

One (1) 2-1/2" NSTF X 1-1/2" NSTM reducer with cap will be provided on the driver's side # 1 discharge.

The driver's side # 1 discharge valve will be controlled by a push/pull handle located on the operator's panel.

The driver's side # 1 discharge will be equipped with a Class One 2 1/2" pressure gauge which will contain a vibration dampened internal mechanism. To prevent internal freezing, the stem and Bourdon tube will be filled with low temperature oil and be sealed from the water system using an isolating diaphragm located in the stem. A bright metal bezel will be supplied for resistance to corrosion and to protect the lens and case from damage.

The pressure gauge will be illuminated internally using light emitting diodes, which will be wired through the pump panel light circuit. The gauge face will be white with black numerals.

The color of the illuminated Class One gauge will be Red.

**DRIVER'S SIDE MAIN DISCHARGE #2**

A discharge will be provided and located at the driver's side pump panel. The driver's side discharges # 2 will terminate with NST threads, through the left panel above the main pump intake.

The main pump discharge will be plumbed directly from the pump discharge manifold utilizing direct connect discharge valve flanges.

A 2 1/2" Akron, # 8800 series, full flow, stainless steel ball valve will be provided for the driver's side # 2 discharge. The valve will be equipped with the Akron "Tork-Lok" feature.

The discharge valve will be equipped with integral 2 1/2" NST, 30 degree, chrome plated elbow.

The driver's side # 2 discharge cap provided as standard equipment will be deleted.

A 2-1/2" NSTF X 1-1/2" NSTM reducer with cap will be provided on the driver's side # 2 discharge.

The driver's side # 2 discharge valve will be controlled by a push/pull handle located on the operator's panel.

The driver's side # 2 discharge will be equipped with a Class One 2 1/2" pressure gauge which will contain a vibration dampened internal mechanism. To prevent internal freezing, the stem and Bourdon tube will be filled with low temperature oil and be sealed from the water system using an isolating diaphragm located in the stem. A bright metal bezel will be supplied for resistance to corrosion and to protect the lens and case from damage.

The pressure gauge will be illuminated internally using light emitting diodes, which will be wired through the pump panel light circuit. The gauge face will be white with black numerals.

The color of the illuminated Class One gauge will be Red.

**OFFICER'S SIDE MAIN DISCHARGE #1**

A discharge will be provided and located at the officer's side pump panel. The officer's side discharges #1 will terminate with NST threads, through the officer's side panel above the main pump intake.

The main pump discharge will be plumbed directly from the pump discharge manifold utilizing direct connect discharge valve flanges.

A 4" Akron, # 8840 series, full flow, flat ball valve will be provided for the officer's side # 1 discharge.

The discharge valve will be equipped with a straight 4" NST adapter.

A 4" NST chrome plated pressure vented cap will be installed on officer's side # 1 discharge.

A 4" NSTF X 5" Storz Kochek SKE-R 30° adapter with cap will be provided on the officer's side # 1 discharge.

The officer's side # 1 discharge valve will be equipped with an Akron Brass Style 9313 Valve Controller. The electric controls must be of current limiting design, requiring no clutches in the motor. The unit must have booted switches with momentary open and close as well as an optional one touch full open feature to operate the actuator. The unit must provide position indication through 10 LED light indicators for maximum visibility.

The officer's side # 1 discharge will be equipped with a Class One 2 1/2" pressure gauge which will contain a vibration dampened internal mechanism. To prevent internal freezing, the stem and Bourdon tube will be filled with low temperature oil and be sealed from the water system using an isolating diaphragm located in the stem. A bright metal bezel will be supplied for resistance to corrosion and to protect the lens and case from damage.

The pressure gauge will be illuminated internally using light emitting diodes, which will be wired through the pump panel light circuit. The gauge face will be white with black numerals.

The color of the illuminated Class One gauge will be Red.

**OFFICER'S SIDE MAIN DISCHARGE #2**

A discharge will be provided and located at the officer's side pump panel. The officer's side discharges #2 will terminate with NST threads, through the officer's side panel above the main pump intake.

The main pump discharge will be plumbed directly from the pump discharge manifold utilizing direct connect discharge valve flanges.

A 2 1/2" Akron, # 8800 series, full flow, stainless steel ball valve will be provided for the officer's side #2 discharge. The valve will be equipped with the Akron "Tork-Lok" feature.

The discharge valve will be equipped with a straight 2 1/2" NST adapter that will be equipped with a 2 1/2" NST, 30-degree, chrome plated elbow.

The officer's side #2 discharge cap provided as standard equipment will be deleted.

A 2-1/2" NSTF X 1-1/2" NSTM reducer w/cap will be provided on the officer's side #2 discharge.

The officer's side #2 discharge valve will be controlled by a push/pull handle located on the operator's panel.

The officer's side #2 discharge will be equipped with a Class One 2 1/2" pressure gauge which will contain a vibration dampened internal mechanism. To prevent internal freezing, the stem and Bourdon tube will be filled with low temperature oil and be sealed from the water system using an isolating diaphragm located in the stem. A bright metal bezel will be supplied for resistance to corrosion and to protect the lens and case from damage.

The pressure gauge will be illuminated internally using light emitting diodes, which will be wired through the pump panel light circuit. The gauge face will be white with black numerals.

The color of the illuminated Class One gauge will be Red.

**DRIVER SIDE HOSE BED DISCHARGE**

A 2 1/2" NST rear hose bed discharge will be plumbed to the upper front body panel, extending into the front of the hose bed.

The rear hose bed discharge will terminate just above the hosebed floor, in the driver side front of the hose bed.

The driver side hose bed discharge pipe will be equipped with a chrome 2 1/2" NSTM thread adapter.

The driver side hose bed discharge will be plumbed utilizing 2 1/2" schedule 10, stainless steel piping, 45 degree threaded elbows and a limited number of 90 degree sweep elbows in an assembly from the pump to the rear of the vehicle.

A minimum of one (1) grooved pipe coupling will be furnished in this assembly to allow for flex and serviceability.

A 2 1/2" Akron, #8800 series, full flow, stainless steel ball valve will be provided for the driver side hose bed side rear discharge. The valve will be equipped with the Akron "Tork-Lok" feature.

The driver side hose bed discharge valve will be controlled by a push/pull handle located on the operator's panel.

The driver's side hose bed discharge cap provided as standard equipment will be deleted.

The driver side hose bed discharge will be equipped with a Class One 2 1/2" pressure gauge which will contain a vibration dampened internal mechanism. To prevent internal freezing, the stem and Bourdon tube will be filled with low temperature oil and be sealed from the water system using an isolating diaphragm located in the stem. A bright metal bezel will be supplied for resistance to corrosion and to protect the lens and case from damage.

The pressure gauge will be illuminated internally using light emitting diodes, which will be wired through the pump panel light circuit. The gauge face will be white with black numerals.

The color of the illuminated Class One gauge will be Red.

**OFFICER'S SIDE HOSE BED DISCHARGE**

A 2 1/2" NST rear hose bed discharge will be plumbed to the upper front body panel, extending into the front of the hose bed.

The rear hose bed discharge will terminate just above the hose bed floor, in the officer's side front of the hose bed.

The officer's side hose bed discharge pipe will be equipped with a chrome 2 1/2" NSTM thread adapter.

The officer's side hose bed discharge will be plumbed utilizing 2 1/2" schedule 10, stainless steel piping, 45 degree threaded elbows and a limited number of 90 degree sweep elbows in an assembly from the pump to the rear of the vehicle.

A minimum of one (1) grooved pipe coupling will be furnished in this assembly to allow for flex and serviceability.

A 2 1/2" Akron, #8800 series, full flow, stainless steel ball valve will be provided for the hose bed officer's side rear discharge. The valve will be equipped with the Akron "Tork-Lok" feature.

The officer's side hose bed discharge valve will be controlled by a push/pull handle located on the operator's panel.

The officer's side hose bed discharge cap provided as standard equipment will be deleted.

The officer's side hose bed discharge will be equipped with a Class One 2 1/2" pressure gauge which will contain a vibration dampened internal mechanism. To prevent internal freezing, the stem and Bourdon tube will be filled with low temperature oil and be sealed from the water system using an isolating diaphragm located in the stem. A bright metal bezel will be supplied for resistance to corrosion and to protect the lens and case from damage.

The pressure gauge will be illuminated internally using light emitting diodes, which will be wired through the pump panel light circuit. The gauge face will be white with black numerals.

The color of the illuminated Class One gauge will be Red.

**DECK GUN DISCHARGE**

A deck gun discharge will be plumbed from the pump to an area on top of the vehicle. The deck gun piping will be firmly supported and braced.

The deck gun discharge will be located in the dunnage area above the pump module on the officer's side of the vehicle. A pedestal type, 1/4" steel plate support assembly will be provided to stabilize deck gun plumbing below deck gun mount flange.

The deck gun discharge pipe will terminate with 3" NPT threads.

To improve the operation range of the deck gun, the discharge pipe will be outfitted with an electric TFT (18") Extend-A-Gun RC3, part # XGA38VL-RL. The electric Extend-A-Gun will be equipped with a up/down control located on the pump operator's panel. The Extend-A-Gun will be wired to the hazard light on the cab dash.

The deck gun piping will be designed so the overall height of the deck gun in the mounted/stowed position does not exceed the tallest point on the cab/body.

The deck gun discharge will be plumbed utilizing 3" schedule 10, stainless steel piping, 45 degree threaded elbows and a limited number of 90 degree sweep elbows in an assembly from the pump to the deck gun location.

A minimum of one (1) grooved pipe coupling will be furnished in this assembly to allow for flex and serviceability.

A 3" Akron, #8800 series, full flow, stainless steel ball valve will be provided for the deck gun discharge. The valve will be equipped with the Akron "Tork-Lok" feature.

The deck gun discharge valve will be controlled by a push/pull handle located on the operator's panel.

The deck gun discharge will be equipped with a Class One 2 1/2" pressure gauge which will contain a vibration dampened internal mechanism. To prevent internal freezing, the stem and Bourdon tube will be filled with low temperature oil and be sealed from the water system using an isolating diaphragm located in the stem. A bright metal bezel will be supplied for resistance to corrosion and to protect the lens and case from damage.

The pressure gauge will be illuminated internally using light emitting diodes, which will be wired through the pump panel light circuit. The gauge face will be white with black numerals.

The color of the illuminated Class One gauge will be Red.

**TFT ELECTRIC DECK GUN**

A TFT Typhoon RC monitor will be supplied and mounted on the deck gun discharge of the unit to provide the maximum travel clearance. The monitor will be controlled from the pump operator's panel.

**TFT MASTER STREAM NOZZLE**

A TFT model "MASTER STREAM" 1500 g.p.m. electric nozzle will be supplied with the deck gun.

**TFT STACKED TIPS**

A set of TFT stacked tips and stream straightener will be provided with the monitor.

**TFT OPERATOR STATION**

The electric deck gun will be controlled using a TFT tethered controller. The controller will be equipped with 30' of cable to allow the operator to control the deck gun away from the vehicle.

**FRONT DISCHARGE**

A 1 1/2" front #1 discharge will be plumbed to the front bumper of the vehicle.

The front #1 discharge will terminate on the top driver's side of the front bumper extension gravel shield with a chrome 1 1/2" NST chicksan swivel adapter.

The front #1 discharge will be plumbed utilizing 2" schedule 10, stainless steel piping and/or flexible hose, 45 degree threaded elbows and a limited number of 90 degree sweep elbows in an assembly from the pump to the front of the vehicle.

A minimum of one (1) grooved pipe coupling will be furnished in this assembly to allow for flex and serviceability. Automatic discharge drains will be provided at all low points in the plumbing.

A 2" Akron, #8800 series, full flow, stainless steel ball, valve will be provided for the front #1 discharge. The valve will be equipped with the Akron "Tork-Lok" feature.

The front #1 discharge valve will be controlled by a push/pull handle located on the operator's panel.

A 1 1/2" NST chrome plated pressure vented cap will be installed the front #1 discharge.

The front #1 discharge will be equipped with a Class One 2 1/2" pressure gauge which will contain a vibration dampened internal mechanism. To prevent internal freezing, the stem and Bourdon tube will be filled with low temperature oil and be sealed from the water system using an isolating diaphragm located in the stem. A bright metal bezel will be supplied for resistance to corrosion and to protect the lens and case from damage.

The pressure gauge will be illuminated internally using light emitting diodes, which will be wired through the pump panel light circuit. The gauge face will be white with black numerals.

The color of the illuminated Class One gauge will be Red, on the front #1 discharge.

**HORIZONTAL CROSSLAY #1**

A crosslay hose bed will be provided and plumbed from the pump in a transverse design, located above the pump enclosure for quick attack deployment. The crosslay hose bed flooring will be designed to be removable, constructed from brushed finish, perforated aluminum material.

Crosslay #1 will be designed to have a minimum total capacity of 3.5 cubic feet as required by NFPA -1901 to accommodate a minimum of 250 feet of 1-3/4" fire hose.

Crosslay #1 hosebed will be designed to accommodate the fire hose in a double stack configuration.

The crosslay discharge will terminate below the hosebed floor with a 1 1/2" NSTM chicksan swivel adapter. The crosslay hose bed floor will be slotted to allow the swivel to extend up through the floor, allowing the pre-connected hose to be pulled off either side of the apparatus without kinking the hose at the coupling connection.

The crosslay #1 discharge will be plumbed utilizing 2" schedule 10, stainless steel piping and/or flexible hose, 45 degree threaded elbows and a limited number of 90 degree sweep elbows in an assembly from the pump to crosslay hosebed.

A minimum of one (1) grooved pipe coupling will be furnished in this assembly to allow for flex and serviceability.

A 2" Akron, #8800 series, full flow, stainless steel ball, valve will be provided for the crosslay #1 discharge. The valve will be equipped with the Akron "Tork-Lok" feature.

The crosslay #1 discharge valve will be controlled by a push/pull handle located on the operator's panel.

The crosslay #1 discharge will be equipped with a 2 ½" diameter Noshok pressure gauge. The gauge will have a rugged corrosion free stainless steel case and clear scratch resistant molded crystals with captive O-ring seals to ensure distortion free viewing and seal the gauge. The gauge will be filled with a synthetic mixture to dampen shock and vibration, lubricate the internal mechanisms, prevent lens condensation and ensure proper operation from –40℉ to +160℉.

The gauge will exceed ANSI B40.1 Grade A requirements with an accuracy of +/- 1.5% full scale and include a size appropriate phosphorous bronze bourdon tube with a reinforced lap joint and large tube base to increase the tube life and gauge accuracy.

A polished chrome-plated stainless steel bezel will be provided to prevent corrosion and protect the lens and gauge case. The gauge will have black graphics on a white background.

**HORIZONTAL CROSSLAY #2**

A crosslay hose bed will be provided and plumbed from the pump in a transverse design, located above the pump enclosure for quick attack deployment. The crosslay hose bed flooring will be designed to be removable, constructed from brushed finish, perforated aluminum material.

Crosslay #2 will be designed to have a minimum total capacity of 3.5 cubic feet as required by NFPA-1901 to accommodate a minimum of 250 feet of 1-3/4" fire hose.

Crosslay #2 hosebed will be designed to accommodate the fire hose in a double stack configuration.

The crosslay discharge will terminate below the hose bed floor with a 1 1/2" NSTM chicksan swivel adapter. The crosslay hose bed floor will be slotted to allow the swivel to extend up through the floor, allowing the pre-connected hose to be pulled off either side of the apparatus without kinking the hose at the coupling connection.

The crosslay #2 discharge will be plumbed utilizing 2" schedule 10, stainless steel piping and/or flexible hose, 45 degree threaded elbows and a limited number of 90 degree sweep elbows in an assembly from the pump to crosslay hosebed.

A minimum of one (1) grooved pipe coupling will be furnished in this assembly to allow for flex and serviceability.

A 2" Akron, #8800 series, full flow, stainless steel ball valve will be provided for the crosslay #2 discharge. The valve will be equipped with the Akron "Tork-Lok" feature.

The crosslay #2 discharge valve will be controlled by a push/pull handle located on the operator's panel.

The crosslay #2 discharge will be equipped with a 2 ½" diameter Noshok pressure gauge. The gauge will have a rugged corrosion free stainless steel case and clear scratch resistant molded crystals with captive O-ring seals to ensure distortion free viewing and seal the gauge. The gauge will be filled with a synthetic mixture to dampen shock and vibration, lubricate the internal mechanisms, prevent lens condensation and ensure proper operation from –40℉ to +160℉.

The gauge will exceed ANSI B40.1 Grade A requirements with an accuracy of +/- 1.5% full scale and include a size appropriate phosphorous bronze bourdon tube with a reinforced lap joint and large tube base to increase the tube life and gauge accuracy.

A polished chrome-plated stainless steel bezel will be provided to prevent corrosion and protect the lens and gauge case. The gauge will have black graphics on a white background.

**HORIZONTAL CROSSLAY #3**

A crosslay hose bed will be provided and plumbed from the pump in a transverse design, located above the pump enclosure for quick attack deployment. The crosslay hose bed flooring will be designed to be removable, constructed from brushed finish, perforated aluminum material.

Crosslay #3 will be designed to have a minimum total capacity of 3.5 cubic feet as required by NFPA -1901 to accommodate a minimum of 250 feet of 2 1/2" fire hose.

Crosslay #3 hose bed will be designed to accommodate the fire hose in a double stack configuration.

The crosslay discharge will terminate below the hosebed floor with a 2 1/2" NSTM chicksan swivel adapter. The crosslay hose bed floor will be slotted to allow the swivel to extend up through the floor, allowing the pre-connected hose to be pulled off either side of the apparatus without kinking the hose at the coupling connection.

The crosslay #3 discharge will be plumbed utilizing 2 1/2" schedule 10, stainless steel piping and/or flexible hose, 45 degree threaded elbows and a limited number of 90 degree sweep elbows in an assembly from the pump to crosslay hosebed.

A minimum of one (1) grooved pipe coupling will be furnished in this assembly to allow for flex and serviceability.

A 2 1/2" Akron, #8800 series, full flow, stainless steel ball valve will be provided for the crosslay #3 discharge. The valve will be equipped with the Akron "Tork-Lok" feature.

The crosslay #3 discharge valve will be controlled by a push/pull handle located on the operator's panel.

The crosslay #3 discharge will be equipped with a 2 ½" diameter Noshok pressure gauge. The gauge will have a rugged corrosion free stainless steel case and clear scratch resistant molded crystals with captive O-ring seals to ensure distortion free viewing and seal the gauge. The gauge will be filled with a synthetic mixture to dampen shock and vibration, lubricate the internal mechanisms, prevent lens condensation and ensure proper operation from –40℉ to +160℉.

The gauge will exceed ANSI B40.1 Grade A requirements with an accuracy of +/- 1.5% full scale and include a size appropriate phosphorous bronze bourdon tube with a reinforced lap joint and large tube base to increase the tube life and gauge accuracy.

A polished chrome-plated stainless steel bezel will be provided to prevent corrosion and protect the lens and gauge case. The gauge will have black graphics on a white background.

**PUMP ENCLOSURE HOSEBED HOSE RETENTION**

A bi-folding 3/16" polished aluminum tread plate cross lay cover will be provided. One (1) full length stainless steel hinge at the front of the cover and one (1) at the center located to rest on top of a cross lay partition for support.

Flaps made from one-inch webbing will be provided at each side of the transverse cross lay compartment secured to the tread plate cross lay cover by quarter turn fasteners, and equipped with a strap to each end.

The crosslay end flap will be red in color.

******** CONCENTRATE PIPING & FOAM SYSTEM ********

**FOAM PIPING**

All foam concentrate plumbing from the tank or auxiliary foam inlet to the foam system components will be stainless steel.

The foam system piping will incorporate a check valve to prevent water from entering the foam tank; the discharge piping will also include a check valve to prevent foam solution from back feeding into the discharge side of the pump. Individual discharge piping will be as specified for each discharge.

The complete foam system will be tested in accordance with Chapter 17 of NFPA-1901.

**FOAMPRO FOAM INJECTION SYSTEM**

A FoamPro model 2001, electronic, fully automatic, variable speed, direct injection, discharge side foam proportioning system will be installed in the pumping system. The system will be capable of handling Class "A" foam concentrates and most Class "B" foam concentrates. The foam proportioning operation will be based on direct measurement of water flows, and remain consistent within the specified flows and pressures. System must be capable of delivering accuracy to within 3% of calibrated settings over the advertised operation range when installed according to factory standards. The system will be equipped with a digital electronic control display suitable for installation on the pump panel. Incorporated within the control display will be a microprocessor that receives input from the system flowmeter, while also monitoring foam concentrate pump output, comparing values to ensure that the operator preset proportional amount of foam concentrate is injected into the discharge side of the fire pump.

A paddlewheel-type flowmeter will be installed in the discharge or manifold system specified to be "foam capable".

A Full flow check valve will be provided to prevent foam contamination of fire pump and water tank or water contamination of foam tank.

A 12 or 24-volt electric motor drive positive displacement foam concentrate pump, rated up to 2.5 GPM (9.5 L/min) @ 150 psi with operating pressures up to 400 psi (27.6 BAR), will be installed in a suitable, accessible location. The system will draw a maximum of 40 amps @ 12 VDC or 21 amps @ 24 VDC. A pump motor electronic driver (mounted to the base of the pump) will receive signals from the computer control display and power the 1/2 hp (0.40 Kw) electric motor directly coupled to the concentrate pump in a variable speed duty cycle to ensure that the correct proportion of concentrate preset by the pump operator is injected into the water stream.

The digital computer control display located on the pump operator's panel will enable the pump operator to perform the following control and operation functions for the foam proportioning system:

- Provide push-button control of foam proportioning rates from 0.1% to 9.9%, in 0.1% increments
- Show current flow-per-minute of water
- Show total volume of water discharged during and after foam operations are completed
- Show total amount of foam concentrate consumed
- Simulate flow rates for manual operation
- Perform setup and diagnostic functions for the computer control microprocessor
- Flash a “low concentrate” warning when the foam concentrate tank(s) runs low
- Flash a “no concentrate” warning and shut the foam concentrate pump off, preventing damage to the pump, should the foam tank(s) empty

The digital computer control display will interface with the options listed; provide dual foam calibration, and display separate totals for each foam concentrate used. If two foam tanks are required and piped to the foam concentrate pump, either an electric dual tank valve or the manual dual tank valve will be provided.

Components of the complete proportioning system will include:

- Operator control and display
- Paddlewheel flowmeter
- Pump and electric motor/motor driver
- Wiring harnesses
- Low-level tank switch (Switches)
- Electronic dual tank valve or manual dual tank valve (if more than one tank)
- Foam injection check valve
- Main waterway check valve

Accurate concentration proportioning can be achieved, based on the following water flows:

- 85 GPM water 3.0% concentration
- 260 GPM water 1.0% concentration
- 520 GPM water 0.5% concentration
- 1300 GPM water 0.2% concentration

Note: Multiple discharges plumbed to this system may affect performance if the flow rates are exceeded by any one discharge or the totality of multiple discharges at one time!

The discharge piping will be equipped with a properly sized flowmeter sensor, based on the systems capabilities.

The foam system will be plumbed to the following discharge/s through the discharge piping or manifold system:

Crosslay #1 discharge and other as designated by the fire department.

The foam proportioning system will be supplied from the foam concentrate storage tank/s. The tank/s will be constructed of materials compatible with foam concentrates being used in the system. Tank capacity, venting, fill opening and foam outlet plumbing connections will be in accordance with NFPA requirements. Foam tank lid will be sealed and latched in accordance with NFPA standards. If required a provision will be made for installation of low tank level sensors and routing of the wiring for the sensors.

**FOAMPRO POWER-FILL**

The apparatus will be equipped with an electronic, automatic, concentrate refill system. System will operate independently of the foam proportioner allowing simultaneous use. Refill operation will not require apparatus or fire pump to be running. The system will be capable of handling Class A or Class B foam concentrates, emulsifiers, gels and decontamination concentrates. The apparatus will be plumbed from the externally accessed intake/flush ports to the concentrate cell following manufacturer's recommendations. The external fill and flush connections to be quick-connect, cam-lock type. Internal piping to incorporate check valves to prevent back flow. Concentrate tank inlet will be positioned to minimize agitation per manufacturers recommendations. The refill operation will be based on direct measurement of concentrate level in tank. System must be capable of automatically stopping when cell is full and include a manual override feature. The system will be equipped with an electronic control suitable for installation on the pump panel. Incorporated within the control will be a microprocessor that receives input from the system while controlling foam concentrate pump output. An all bronze three-way valve will be included to allow the operator to flush system after use. Valve control, intake and flush ports will be located within corresponding panel plate.

The system will enable the operator to perform the following control/operation functions and status indicators for the refill operation:

- Provide push-button start/stop control of foam refill
- Solid green light advises operator concentrate cell is full
- Flashing green indicates system is running
- Green light off, system off
- Allow override of "full tank" condition
- Provide a means to flush the pump and intake piping

System will include a 12 or 24-volt electric motor driven, positive displacement concentrate pump. Pump will deliver minimum flow of 10 GPM (37.8 L/min) @ 20 psi with all concentrates currently utilized in fire apparatus. Pump body to be of all bronze construction and other wetted components and piping to be constructed of non-corrosive materials. The system will draw a maximum of 38 amps @ 12 VDC or 19 amps @ 24 VDC. A pump/motor solenoid (mounted to the base of the pump) will receive signals from the computer control display and power the 1/2 hp (0.4 Kw) electric motor directly coupled to the concentrate pump. The system will receive readings when the concentrate tank is full and stop operation to prevent overfill.

Components of the complete refill system will include:

- Operator control and display with Weather-Pac connectors
- Refill/flush quick-connect cam-lock fittings and cap
- Check valves
- Pump/motor assembly and solenoid
- Strainer

- Tank level switch
- Three-way fill/flush valve
- Stainless steel pick-up wand and 6 feet of reinforced suction hose, 1 in diameter to allow maximum flow
- Panel placards

**FOAM CONCENTRATE**

The foam system will be capable of injecting the following foam concentrates:

- **No Class A foam selected.**
- **No Class B foam selected or Class B foam system present.**

****** PUMP PANEL & ACCESSORIES *******

**PUMP PANEL - SIDE MOUNT**

The pump operator's control panel will be located on the driver side of the apparatus. The pump enclosure side panels will be completely removable and designed for easy access and servicing.

**PUMP PANEL MATERIAL**

The left side operator's panel, gauge panel, right side pump panel and right side access door will be fabricated from 1/8" black vinyl clad aluminum with a grained finish.

**HINGED GAUGE PANEL**

A full width, vertically hinged gauge access panel will be provided at the operator's position. Chrome plated positive locks will be provided along with chain holders to prevent the front of the gauge panel from coming in contact with other panels when open.

**VERTICALLY HINGED, SPLIT PUMP PANEL OFFICER SIDE**

The officer's side pump panel will be split, vertically hinged, to provide complete access to the pump and plumbing on the officer side of the pump enclosure. The panels will be equipped with stainless steel hinges and secured with push type locks to hold the panels closed. The drains located on the officer's side panel will be fastened to the lower panel, which will be stationary.

**PUMP ACCESS PANELS**

Two (2) removable pump access panels will be furnished at the forward area of the pump enclosure accessed from the front when the cab is tilted. Each access panel will be fabricated from 1/8" aluminum tread plate.

**PANEL FASTENERS**

Stainless steel machine screws and lock washers will be used to hold these panels in position. The panels will be easily removable to provide complete access to the pump for major service.

**CAPS AND ADAPTERS SAFETY TETHER**

All applicable discharge and suction caps, plugs and adapters will be equipped with chrome plated ball chain or double looped coil chain and secured to the vehicle.

**PUMP PANEL TRIM PLATES**

A high polish stainless steel trim plate will be provided around each discharge port and suction inlet opening to allow accessibility to the respective valve for service and repairs.

**DISCHARGE GAUGE TRIM BEZELS**

Each individual discharge gauge will be installed into a decorative chrome-plated mounting bezel that incorporates valve-identifying verbiage and color labels.

The pump panel identification plates will be securely fastened to the pump panels with machine screws.

**PUMP OPERATOR'S PANEL LIGHT SHIELD**

The pump operator’s panel will be equipped with a light shield that will be full width of the control panel, and will be positioned to cover the lights and prevent glare.

The light shield will be equipped with the following lights:

- Amdor Luma Bar H2O super bright led strip lights.

**OFFICER SIDE PANEL LIGHTING**

The officer's side pump panel and running board will be illuminated by the following lights:

- Four (4) Whelen #OAC0EDCR 45 degree LED illumination lights.

The lights will be switched with the main pump panel lights.

**PUMP OPERATOR'S PANEL**

Particular attention is to be given to functional arrangement of all controls. The pump operator's panel will accommodate the following:

- Hinged gauge panel
- Water tank fill valve
- Auxiliary suction valve control
- All discharge valve controls
- Auxiliary engine cooler controls
- Water tank suction control valve
- Pump primer valve
- Engine throttle control
- Master compound vacuum gauge
- Master pressure gauge
- Individual discharge gauges
- Pump shift engaged indicator light
- Water tank water level indicator

- Engine tachometer
- Engine oil pressure gauge with audible alarm
- Engine water temperature gauge with audible alarm
- Low voltage light and audible alarm
- Pump panel light switch
- Speed counter (Underwriters)
- Pump performance plate (Underwriters)
- Pump serial No. plate
- Master pump drain valve
- Individual drains
- Voltmeter
- Air inlet/outlet at lower driver side panel
- Pump panel air horn actuation button.
- Class One "TPG+" pressure governor control.

**PUMP TEST PORTS**

The pump panel will be equipped with Vacuum & Pressure test plugs to allow for test equipment to monitor pump pressure and vacuum levels. Chrome plugs and labels will be provided for the test ports.

**ENGINE COOLER**

An auxiliary cooler or heat exchanger will be installed in the engine compartment between the engine and the chassis radiator. The cooler will permit the use of water from the pump for cooling system. The cooling will be done without mixing engine and pump water.

**TANK LEVEL GAUGE**

An Innovative Controls model #3030385, Ultra-Bright LED water level monitor will be provided on the pump operator's panel. The level gauge will contain fourteen (14) high intensity LED's on the display in a "V" pattern allowing the full, 3/4, 1/2, 1/4 and refill levels to be easily distinguished at a glance. It will be maintenance free and field adjustable.

The gauge will use a pressure transducer installed near the bottom of the water tank to determine the correct volume in the tank.

An Innovated Controls model #3030362, remote relay module will be furnished to provide outputs for large indicator lights on the side of the vehicle.

**LARGE LIGHT WATER LEVEL GAUGE, EACH SIDE OF CAB**

A large light water level gauge system will be provided on both sides of the cab. Each side will have a Whelen model PSTANK, LED strip light, surface mounted, behind the rear crew door above the handrail.

The strip light will indicate the following water levels:

- Green LED cluster — Full tank
- Blue LED cluster — 3/4 tank
- Amber LED cluster — 1/2 tank
- Red LED cluster — 1/4 tank

The red LED's will burn steady to indicate 1/4 tank and will start to flash when the water level drops below 1/4 tank. To prevent distraction to drivers, this tank level gauge will be wired to display only when the park brake is engaged.

**FOAM TANK LEVEL GAUGE - FOAM TANK "A"**

An Innovative Controls model #3030386-01, Ultra-Bright LED foam level monitor will be provided on the pump operator's panel. The level gauge will contain fourteen (14) high intensity LED's on the display in a "V" pattern allowing the full, 3/4, 1/2, 1/4 and refill levels to be easily distinguished at a glance. It will be maintenance free and field adjustable.

The gauge will use a pressure transducer installed near the bottom of the foam tank to determine the correct volume in the tank.

**WATER TANK**

The water tank will have a capacity of 1000 gallons, constructed from Poly material.

**FOAM TANK "A"**

In addition to the water capacity of the tank, a 30 gallon integral foam storage area will be built into the water tank. The foam tank will have a latched fill tower, properly labeled as the foam fill point. A valved drain will be provided.

**TANK CONSTRUCTION**

The Poly water tank will be constructed from 1/2" thick polypropylene sheet stock. This material will be a non corrosive stress relieved thermo-plastic, natural in color, and U.V. stabilized for maximum protection.

The water and foam tanks will be of a specific configuration and will also designed to be completely independent of the body and compartments. All joints and seams will be nitrogen welded and tested for maximum strength and integrity. The top of the booster tank will be fitted with removable lifting eyes designed with a 3 to 1 safety factor to facilitate easy removal. The transverse swash partitions will be manufactured of 3/8" polypropylene (natural in color) and extend from approximately 4" off the floor to just under the cover. The longitudinal swash partitions will be constructed of 3/8" polypropylene (natural in color) and extend from the floor of the tank through the cover to allow for positive welding and maximum integrity. All partitions will be equipped with vent and air holes to permit movement of air and water between compartments. The partitions will be designed to provide maximum water flow. All swash partitions interlock with one another and are welded to each other as well as to the walls of the tank.

**TANK LID**

The tank cover will be constructed of 1/2" thick polypropylene, natural in color, and U.V. stabilized, to incorporate a multi three-piece design, which allows for individual removal and inspection if necessary. The tank cover will be recessed 3/8" from the top of the tank and will be welded to both sides and longitudinal partitions for maximum integrity. Each one of the covers will have hold downs consisting of 2" polypropylene dowels spaced a maximum of 30" apart. These dowels will extend through the covers and become welded to the transverse partitions. This will assist in keeping the cover rigid under fast filling conditions. A minimum of two lifting dowels will be drilled and tapped 1/2" X 13" to accommodate the lifting eyes.

**TANK FILL TOWER**

The tank will have a combination vent and manual fill tower. The fill tower will be constructed of 1/2" polypropylene and will be 12" W x 12" L outer perimeter. The tower will have a 1/4" thick removable polypropylene screen and a polypropylene hinged type cover. The fill tower cover will be marked as a water tank fill point.

**OVERFLOW AND VENT PIPE**

The fill tower will be fitted with an integral 4" I.D. schedule 40 P.V.C. combination overflow/vent pipe running from the fill tower through the tank to a 4" coupling flush mounted into the bottom of the tank to allow water to overflow behind the chassis rear axle.

**TANK SUMP**

The tank sump will be a minimum of 10" wide x 10" long x 3" deep. An anti-swirl plate will be mounted inside the sump, approximately 1" above the bottom of the sump.

**TANK SUMP CONNECTION**

The front bulkhead of the water tank will be fitted with one (1) tank sump.

A 3" drain plug will be provided.

**OUTLETS**

There will be two (2) standard tank outlets; one for tank-to-pump suction line which will be a minimum of 4" coupling and one for a tank fill line which will be a minimum of a 2" N.P.T. coupling. All tank fill couplings will be backed with flow deflectors to break up the stream of water entering the tank.

**TANK MOUNTING**

The tank will rest on the body cross members spaced a maximum of 22" apart, and will be insulated from these cross members with a minimum of 3/8" nylon webbing or 1/2" rubber, 2-1/2" wide. The tank will sit cradle-mounted using four (4) corner angles of 6 x 6 x 4 x 0.250 welded directly to the body cross members. The angles will keep the tank from shifting left to right or front to rear. The tank is designed on the free-floating suspension principle and will not require the use of hold downs. The tank will be completely removable without disturbing or dismantling the apparatus body structure. The body or hose bed cross braces will act as water tank retainers.

**APPARATUS BODY DESIGN CONSTRUCTION**

The body side and compartment assemblies will be designed and assembled to provide maximum strength and durability under all operating conditions.

Special attention will be taken to minimize corrosion on all fabricated parts and structural members of the body. All bolt-on components will be provided with a dissimilar metals isolation barrier to prevent electric corrosion. The body design will also incorporate removable panels to access spring hangers, rear body mounts and fuel tank sending units.

The body assembly will be an all-welded configuration. The body will be completely isolated from the cab and pump module structure.

**BODY AND COMPARTMENT FABRICATION - 3/16" ALUMINUM**

All compartment panels and body side sheets will be entirely 3/16" aluminum (5052-H32). Each side compartment assembly will be both plug welded and stitch welded to ensure proper weld penetration on all panels while avoiding the possible warping caused by a full seam weld. The side compartments will be welded on a fixture to ensure true body dimensions of all door openings. The side compartments and body side panels are then set into a body squaring fixture where the super structure is installed and the entire body is aligned to be completely symmetrical. The super structure is then welded to the compartment side panels and reinforcement plates are inserted which allows the compartment panels to become an integral component of the body support structure. A full seam weld will not be used due to the applied heat which will distort sheet metal and remove the protective coating from the perimeter of the welded area. All seams will be caulked prior to finish paint to ensure proper compartment seal.

**100" WIDE FIRE BODY**

The fire body will be 100" wide to provide the maximum amount of usable compartment space. All lower compartments will be 26" deep overall, all upper compartments will be 14" deep overall.

**SUPER STRUCTURE - ALUMINUM**

The body super structure will be an all welded configuration utilizing a combination of 3” x 1-1/2” 6061-T6 thick walled structural tubing and 6061 structural channel.

This structure will be designed to totally support the full length and width of the body and will be welded to the body side compartments by use of reinforcement plates to incorporate the compartments into an integral part of the body weldment.

The super structure will be bolted to the sides of the chassis frame at four (4) points.

**STEPPING, STANDING, & WALKING SURFACES**

All stepping, standing, and walking surfaces on the body will meet NFPA #1901 anti-slip standards. Aluminum tread plate utilized for stepping, standing, and walking surfaces will be ALCOA No Slip type. Upon request by the Purchaser, the manufacturer will supply proof of compliance with this requirement.

All vertical surfaces on the body, which incorporate aluminum tread plate material, will utilize the same material pattern to provide a consistent overall appearance.

**DRIVER'S SIDE COMPARTMENTATION**

One (1) full height compartment will be provided forward of the rear wheels, measuring 66" high x 39" wide with a single roll-up door opening 62" high x 36" wide.

One (1) full height compartment will be provided to the rear of the rear wheels, measuring 66" high x 55" wide with a single roll-up door opening 62" high x 52" wide.

One (1) equipment compartment will be provided above the rear wheels, measuring 34" high x 64" wide with a single roll-up door opening 30" high x 58" wide.

The driver's side body compartments will be 26" deep for the full height of the compartments.

**OFFICER'S SIDE COMPARTMENTATION**

One (1) full height compartment will be provided forward of the rear wheels, measuring 66" high x 39" wide with a single roll-up door opening 62" high x 36" wide.

One (1) full height compartment will be provided to the rear of the rear wheels, measuring 66" high x 55" wide with a single roll-up door opening 62" high x 52" wide.

One (1) equipment compartment will be provided above the rear wheels, measuring 34" high x 64" wide with a single roll-up door opening 30" high x 58" wide.

The officer's side body compartments will be 26" deep in the lower full depth section and 14" deep in the upper section.

**ROLL-UP DOORS**

Roll-up doors will be provided on all compartments. The roll-up doors will be constructed from aluminum extruded slats which will have a flexible seal between each slat for proper sealing of the door.

A synthetic rubber seal will be provided at each side, top and bottom edge of the door to prevent entry of dirt into the compartment.

The door will be equipped with a lift bar style latch mechanism which will latch at the bottom of the door mounting extrusion.

The roll-up door assembly will be furnished with a spring-loaded, counter balance assembly to assist in door actuation.

All running board and high side compartments will be equipped with roll-up doors.

**AMDOR ROLL-DOORS**

The roll-up doors will be Amdor brand roll-up doors. The doors and tracks will be painted to match the required color of the fire department.

A total of six (6) painted doors will be provided.

**SWEEP-OUT COMPARTMENT FLOORS**

Compartment floors will be welded to the compartment walls and have a sweep out design for easy cleaning.

Compartments with hinged doors will have the door opening flanges bend down to produce the sweep-out design.

Compartments with roll-up style doors will have the external floor flange stepped down, 1/2" high x 2" deep, to produce a sealing surface for the roll-up doors below the compartment floor. The sweep out design will also permit easy cleaning.

**COMPARTMENT TOPS**

Compartment tops will be covered with polished aluminum tread plate on both sides.

**COMPARTMENT DRIP MOLDING**

Compartment tops over all side compartments will have a 45 degree flange formed out to provide protection against water runoff. A secondary extruded drip molding will be provided between low compartments and auxiliary high side compartments, when auxiliary compartments are provided.

**COATED FASTENERS**

All exterior fasteners will be coated stainless steel screws. Screw threads will be coated with reusable, self-locking, sealing material to provide vibration resistance. Screw heads will be coated with a sealing element to prevent galvanic corrosion between dissimilar metals. Non-coated screws will only be provided as part of vendor supplied component installations.

**COMPARTMENT LOUVERS**

Ventilation between compartments to atmosphere will be provided and located to avoid water entry into compartments.

**ACCESS PANELS**

Removable access panels will be provided in all lower compartments to access spring pins, fuel tank sender, electrical junction compartment and rear body mounts.

Protective panels will be located in the rear compartments providing access to the lights and associated wiring. The covers will also serve as protective covers to prevent inadvertent damage to lights or wiring from tools or equipment located in the compartment.

**REAR BODY PANEL**

The rear body panel will extend the full width between the side compartments. This panel will be full height from the rear step compartment to the hose bed floor. The panel will be bolted on and removable, with no part of the rear panel attached to the booster tank. The rear body panel material will be aluminum treadplate as standard, if Chevron striping is specified for the rear of the body then smooth aluminum will be utilized.

**BODY RUB RAILS**

Sacrificial aluminum tread plate rub rails will be mounted at the base of the body, extend outward a minimum 3/4", downward 2" and flange inward 1". The rub rails will extend the full length of the main body and wrap around the rear body corners. Rub rails will be designed to bolt to the body from the bottom side of the compartment area, so as not to damage the body side panels on initial impact and to provide for ease of replacement.

**RUNNING BOARD STEPS**

The driver and officer running board steps will be fabricated of 3/16" polished aluminum tread plate. The outside edge on each step will be fabricated with a double break, return flange. The steps will be rigidly reinforced with a heavy duty support structure. The running boards will not form any part of the compartment design, and will be bolted into place with a minimum 1/2" clearance gap between any panel to facilitate water runoff.

**OFFICER SIDE RUNNING BOARD STORAGE WELL**

A storage well, constructed of 1/8" aluminum, will be recessed into the officer's side running board. The storage well will measure 9" deep x 9" wide x as long as possible between the running board support members. Drain holes will be located in the bottom corners to allow water to drain from the storage well.

The officer's side running board hose well will be furnished with Velcro straps to secure the hose stored in the well. The straps will be attached to each side of the hose well with stainless steel footman loops.

**DRIVER SIDE RUNNING BOARD STORAGE WELL**

A storage well, constructed of 1/8" aluminum, will be recessed into the driver's side running board. The storage well will measure 9" deep x 9" wide x as long as possible between the running board support members. Drain holes will be located in the bottom corners to allow water to drain from the storage well.

The driver's side running board hose well will be furnished with Velcro straps to secure the hose stored in the well. The straps will be attached to each side of the hose well with stainless steel footman loops.

**REAR STEP**

The rear step will be fabricated from 3/16" polished aluminum tread plate, and will be rigidly reinforced. The rear step will extend 12" past the rear edge of the body, and will be 100" wide, with tapered corners.

The rear edge of the step will be designed to accommodate the rear clearance lights, recessed for protection in the step reinforcement channel. The step treadplate overlay will be bolted to the step frame for ease of replacement.

**INTERMEDIATE REAR STEP**

An eight (8) inch deep, bolt on intermediate rear step, fabricated from 3/16" aluminum tread plate, will be installed. The step will be approximately 8" deep x 48" wide.

**ISOLATED REAR STEP COMPARTMENT**

An isolated rear step compartment measuring 40" high x 46" wide x 30" deep with a door opening of 38" high x 43-3/4" wide will be provided at the rear of the apparatus.

The rear step compartment door will be a roll-up door. The roll-up door will be equipped with a brushed aluminum finish.

**GRAB RAILS**

All hand rails will be 1-1/4" outer diameter, knurled bright anodized aluminum extrusion, designed to meet NFPA 1901 requirements.

Molded gaskets will be installed between the handrail stanchion castings and body surfaces to prevent electrolytic reaction between dissimilar metals and to protect paint.

**GRAB RAIL LOCATIONS:**

Two (2) vertical rails will be mounted on the rear edge of the beavertails, one (1) each side.

One (1) horizontal, full width handrail will be installed on the rear, below the level of the hose bed.

**FOLDING STEPS - REAR OF BODY**

Four (4) Austin Hardware model FS-200 CHR large folding steps, made of high strength die cast aluminum, with a textured chrome plate finish, minimum of 42 $in^2$ surface, conforming to NFPA-1901 requirements, will be provided on the rear of the body, two (2) each side. The steps will be mounted to accommodate access to the body hose bed area with a maximum of 18" height between each step.

**SAFETY SIGN(S) AT REAR STEP AND CROSS WALKWAY(S)**

Safety sign(s) will be located on the vehicle at the rear step, and at any cross walkway(s), to warn personnel that riding in or on these areas while the vehicle is in motion is prohibited.

**REAR WHEEL WELL LINERS**

Fully removable, bolt-in, 1/8" aluminum fender liners will be provided. The wheel well liners will extend from the outer wheel well body panel, into the truck frame. Removable vertical splash shields, inward of the wheels, will be provided to give access to the hydraulic components. The completely washable fender liners will be designed to protect the front and rear compartments and main body supports from road salts, dirt accumulation and corrosion.

**REAR FENDERETTES**

The rear fenders will be equipped with easily replaceable, polished extruded aluminum fenderettes. The fenderettes will be equipped with a rubber gasket molding between the body panel and the fenderette.

***** BODY FENDER STORAGE COMPARTMENTS *****

**DRIVER FRONT FENDER STORAGE**

A storage compartment will be inserted into the front driver side body fender. The compartment will be sized large enough to store three (3) SCBA cylinders or fire extinguishers, with a maximum length of 26". The compartment will have a non-abrasive lined floor area for the three (3) devices. The compartment will be enclosed by a door painted to match the primary body color, with a single point latch and hinge. This compartment will be tied into the compartment door ajar/do not move apparatus warning system.

**OFFICER FRONT FENDER STORAGE**

A storage compartment will be inserted into the front officer side body fender. The compartment will be sized large enough to store three (3) SCBA cylinders or fire extinguishers, with a maximum length of 26". The compartment will have a non-abrasive floor area for the three (3) devices. The compartment will be enclosed by a door painted to match the primary body color, with a single point latch and hinge. This compartment will be tied into the compartment door ajar/do not move apparatus warning system.

**DRIVER REAR FENDER STORAGE**

A storage compartment will be inserted into the rear driver side body fender. The compartment will be sized large enough to store two (2) SCBA cylinders or fire extinguishers, with a maximum length of 26". The compartment will have a non-abrasive floor area for the two (2) devices. The compartment will be enclosed by a door painted to match the primary body color, with a single point latch and hinge. This compartment will be tied into the compartment door ajar/do not move apparatus warning system.

**OFFICER REAR FENDER STORAGE**

A slide out absorbent storage bin will be installed in the rear officer side body fender. The storage bin will be constructed of smooth aluminum and will be sized to store a minimum of 50 lbs. of absorbent material. The bin will be installed on sliding tracks that allow the bin to extend out of the body fender for dumping/filling. There will be a hinged lid on top of the storage bin to add material to the bin, and a spring loaded valve at the bottom to dispense material out of the bin. The compartment will be enclosed by a door painted to match the primary body color, with a single point latch and hinge. This compartment will be tied into the compartment door ajar/do not move apparatus warning system.

**REAR MUD FLAPS**

Heavy duty mud flaps will be provided behind the rear wheels.

**REAR TOW EYES**

Two (2) painted tow eyes will be furnished on the rear of the vehicle. The tow eyes will be made from plate steel and will be bolted directly to the chassis frame rails with grade 8 bolts and will extend below the body. The tow eyes will be smooth and free from sharp edges, and have a minimum eyelet hole of 2-1/2". The tow eyes will be painted.

**HOSE BED (94" WIDE)**

The hose bed will be located directly above the booster tank and will be free from all sharp objects such as bolts, nuts, etc., to avoid damage to fire hose.

The hose bed side walls will be (3) inches thick to accommodate installation of warning and scene lights recess mounted into the side sheet. For added strength and rigidity, the top edge of the front wall will be flanged inward two (2) inches and downward one (1) inch.

The hose bed will be designed with 70 cubic feet of hose storage. This design will accommodate the following hose load:

- 1,500 ft. of 5" Hose
- 800 ft. of 2.5" Hose

**HOSE BED FLOORING**

Flooring to be constructed from extruded aluminum and be properly spaced for ventilation. The flooring will be smooth and free from sharp edges to avoid hose damage. The hose bed floor will be removable to provide access to inner body framework.

**HOSE BED PARTITIONS**

Two (2) fully adjustable 3/16", brushed finish, aluminum hose bed partitions will be provided. Partitions will be easily adjustable by means of Unistrut channels located at the front and rear of the hose bed. Partitions will be removable for access to the booster tank.

The top and rear edge of each of the adjustable hose bed partitions will have an integral tubing reinforcement welded on for additional support.

**HOSE PARTITION CUTOUTS**

The hose bed partitions will have a vertical handhold cutout at upper rear edge of the partition.

**HOSE BED FULL WIDTH DIVIDER**

A full width divider will be installed in the hose bed located approximately 2" beyond the end of the water fill tower. This divider will be constructed of smooth aluminum and will be fixed. The adjustable hose bed dividers will be installed up to this divider with the adjustment tracking attached to the fixed divider.

**HOSE BED COVER, VINYL WITH VELCRO**

A hose bed cover will be provided and installed. The cover will be made from 22 ounce; heavy-duty vinyl coated polyester fabric (TXN 226). The cover will be sewn with ultraviolet resistant thread and will have 2" wide nylon webbing sewn around the perimeter to provide additional strength.

The cover will be secured to the top front body flange with Velcro and quarter turn fasteners and will be secured to the top side body flanges with Velcro. A weighted flap will be furnished on the rear of the cover with two (2) bungee cords.

The Hypalon material will be red in color.

****** COMPARTMENT ACCESSORIES ******

**ADJUSTABLE SHELVING**

Compartment shelving will be constructed of 3/16” brush finish aluminum with a 2” upward bend at front and rear, and side supports. Shelving will be vertically adjustable with spring nuts in aluminum strut channel.

Adjustable shelves will be located as follows:

Four (4) adjustable shelf(s) will be provided and mounted as directed by the fire department.

**SLIDE OUT FLOOR MOUNT SHELVING**

Slide out floor mount compartment shelving will be constructed of 3/16” brush finish aluminum with a 2" upward bend at front and rear, and side supports attached to #250 rated slides. Slide out floor mount shelving will have gas shocks to hold the tray in and out.

Slide out floor mount shelving will be provided as follows:

One (1) roll out tray(s) will be provided and mounted as directed by the fire department.

**500 POUND FLOOR MOUNTED ROLL OUT TRAYS**

Floor mounted roll-out trays will consist of heavy duty, roller bearing slide tracks with an end load rating of 500 pounds, securely fastened to the compartment floor. The tray will be fabricated from 3/16" brushed aluminum with a minimum 2" high flange on each of the four sides to assist in retaining the equipment stored on each tray. The slide tracks will have a 100% extension, allowing the tray to extend out of the compartment completely.

The 500 pound floor mounted roll out trays will be located as follows:

One (1) roll out tray(s) will be provided and mounted as directed by the fire department.

**SWING OUT TOOL BOARD(S)**

One (1) swing out tool board(s) will be provided and mounted as directed by the fire department. The tool board(s) will be constructed of 3/16" aluminum pegboard allowing mounting of equipment on the interior and exterior of the tool board(s). The tool boards will be installed with a Performance Advantage Company PM-1000 Swing-Out Module Kit. Aluminum angles will attach the hinges to Unistrut tracking to allow depth adjustments. A heavy duty thumb latch will be provided to secure the tool board(s) in the closed position.

**VERTICAL PULL OUT TOOL BOARD**

Three (3) vertical pull out tool board(s) will be provided and mounted as directed by the fire department. The tool board(s) will be constructed of 3/16" aluminum pegboard allowing mounting of equipment on both sides of the tool board(s). The tool board will be attached to #250 rated slides, one at the top and one at the bottom of the tool board. 3/16" aluminum angles will attach the slides to tracking to allow horizontal adjustments. A gas shock will be used to secure the tool board in the stored and deployed position.

**ALUMINUM STRUT CHANNEL FOR FUTURE SHELVING**

Four (4) Aluminum Strut Channels will be installed for future shelving installation in the following compartments:

Driver front compartment

Officer front compartment

Driver rear compartment

**TURTLE TILE**

Turtle Tile brand floor material will be installed on all compartment floors. The Turtle Tile will be custom installed to provide full floor coverage.

Floor matting material will be provided on six (6) specified shelf(s) or roll-out tray(s).

The compartment flooring color will be black.

******120/240 VOLT A.C. ELECTRICAL AND GENERATOR SECTION ******

**120/240 VOLT ELECTRICAL SYSTEM TESTING**

All line voltage wiring and permanently connected devices and equipment will be subjected to a dielectric voltage withstand test of 900 volts for one minute. The test will be conducted between live parts and the neutral conductor and between live parts and the vehicle frame with any switches in the circuits closed. The test will be conducted after all bodywork has been completed. The dielectric tester will have a minimum 500 VA transformer with a sinusoidal output voltage that can be verified.

Electrical polarity verification will be made of all permanently wired equipment and receptacles to determine that connections have been properly made.

**OPERATIONAL TESTING**

The apparatus manufacturer will perform the following operation test and will certify that the power source and any devices that are attached to the line voltage electrical system are properly connected and in working order.

The generator will be started from a cold start condition and the line voltage electrical system will be loaded to 100 percent of the nameplate voltage rating.

The following items will be monitored and documented every 15 minutes:

- The cranking time until the generator starts and runs.
- The voltage, frequency, and amperes at continuous full rated load.
- The generator oil pressure, water temperature, transmission temperature, hydraulic temperature, and the battery rate charge, as applicable.
- The ambient temperature and altitude.

The generator will operate at 100 percent of its nameplate wattage for a minimum of two (2) hours.

**HARRISON 10,000-WATT HYDRAULIC DRIVEN GENERATOR**

One (1) Harrison Hydraulic Driven Generator model number 10.0MAS-16R rated at 10000 watts, 40/80 amps, 120/240VAC, 60 Hz, 1-phase will be provided.

The system will be designed and assembled by a company with no less than 10 years experience in the manufacture of hydraulic driven generators. The system will be tested at the full nameplate load prior to shipping and be accompanied with the test report. The test report will document the generators performance at various loads from no load to full load to ensure reliable power delivery at those loads.

The motor/generator will be placed in a frame which affords protection to the components and provides a unitized mounting module containing the motor/generator, reservoir, oil cooler, filtration, on/off manifold containing a cross port check valve allowing unit to be started and shut down remotely.

The generator will be a commercial type with a heavy-duty bearing and of brush less design to ensure low maintenance. No brushes or slip rings will be allowed. The reservoir will include an oil level sight gauge, oil temperature gauge; fill cap, oil filter, and a venturi boost unit to provide positive pressure to the pump suction port.

The generator and motor will be close coupled and aligned using a Morse taper with a through bolt to secure the motor to the generator. No two (2) bearing generators will be permitted.

The system must be capable of producing the full nameplate power when driven from the vehicle PTO from idle to maximum engine speed.

The generator system must be able to operate on either a Constant Engaged PTO or a Hot Shift PTO. The generator must be able to be used while vehicle is either stationary or in motion.

The hydraulic motor and pump will be of axial piston design to provide low internal leakage and a high degree of frequency stability. No gear pumps or motors will be used. The pump will match the system with the proper orifice, pressure compensator, and load sense settings to provide stable output regardless of engine rpm or electrical load demands.

The system will be capable of normal operations using a commonly available ATF fluid, such as GM Dextron III or equivalent. All fluid service points will be in close proximity to the reservoir for ease of scheduled maintenance.

When properly installed, the system will be warranted for a period of not less than two (2) years or 2000 hours, whichever should come first.

The generator will be able to remotely turn systems full kW on or off without regard to engine RPM by using a 12VDC switch. The switch will be mounted in the cab dash.

A weatherproof digital Quadra meter containing the volt, amp, and frequency will be installed near the breaker panel.

**GENERATOR PTO**

A hot shift PTO will be provided on the transmission for the Harrison generator. The PTO will be controlled from the cab. The control will include a PTO engagement switch and a PTO engaged indicator light.

**GENERATOR WARRANTY**

The specified generator will have a two (2) year or two thousand (2000) hour warranty as provided by the generator manufacturer. A copy of the generator warranty will be provided at time of delivery.

**GENERATOR CONTROLS**

In addition to cab controls, the generator will have PTO control at the pump operator's panel. The controls will also include a green light to indicate the generator is running.

**GENERATOR LOCATION**

The generator will be mounted above the pump enclosure on the driver side.

Locating the generator greater than 144" from the main breaker panel may require the installation of an additional power disconnecting means.

**120/240 VOLT LOAD CENTER**

The generator output line conductors will be wired from the generator output connections to a Square D, model #QO112L125G breaker panel. The breaker panel will be equipped with a properly sized main breaker using two (2) of the twelve (12) spaces which leaves a total of ten (10) available spaces.

The generator output conductors will be sized to 115% of the main breaker rating and will be installed as indicated in the wiring section.

Ten (10) appropriately sized, 120 volt, circuit breakers will be provided.

The breaker panel will be located on the rear wall of the driver side upper compartment.

**120/240 VOLT WIRING METHODS**

Wiring/conduit will not be attached to any chassis suspension components, water or fuel lines, air or air brake lines, fire pump piping, hydraulic lines, exhaust system components or low voltage wiring.

All wiring will be installed at a minimum of 12 inches away from any exhaust piping and a minimum of 6 inches from any fuel lines.

All wiring will be securely clamped within 6 inches of any junction box and at a minimum of every 24 inches of run. All supports will be of nonmetallic material or corrosion protected metal. All supports will not cut or abrade conduit or cable and will be mechanically fastened to the vehicle.

All power supply assembly conductors, including neutral and grounding conductors, will have an equivalent amperage rating and will be sized to carry not less than 115% of the main breaker rating.

All Type SO or Type SEO cable not installed in a compartment will be installed in wire loom. Where Type SO or Type SEO cable penetrates a metal surface, a rubber or plastic grommet or bushing will be provided.

The installation of all 120/240 wiring will meet the current NFPA-1901 Standards .

**120/240 VOLT WIRING IDENTIFICATION**

All line voltage conductors located inside the main breaker panel box will be individually and permanently identified. When pre-wiring for future power wiring installations, the non-terminated ends will be labeled showing function and wire size.

**120/240 VOLT GROUNDING**

The neutral conductor of the power source will be bonded to the vehicle fame only at the power source.

The grounded current carrying conductor (neutral) will be insulated from the equipment grounding conductors and from the equipment enclosures and other grounded parts. The neutral conductor will be colored white or gray.

In addition to the bonding required for the lower voltage return current, each body and driving/crew compartment enclosure will be bonded to the vehicle frame by a copper conductor. The conductor will have a minimum amperage rating of 115 percent of the name plate current rating of the power source specification label.

## 120/240 VOLT CIRCUIT BREAKER / RECEPTACLE INSTALLATION

The system will be installed by highly qualified electrical technicians to assure the required level of safety and protection to the fire apparatus operators. When multiple circuit are required, the circuits will be wired to the breaker panel in a staggered configuration to minimize electrical loads on each breaker or generator (leg) circuit. The wiring, electrical fixtures and components will be to the highest industry quality standards available on the domestic market. The equipment will be the type as designed for mobile type installations subject to vibration, moisture and severe continuous usage.

## ELECTRIC CABLE REEL

One (1) Hannay Model #ECR-1618-17-18, 120 volt, electric rewind cord reel will be provided and wired to the breaker panel. The reel will be securely mounted and equipped with a rewind control adjacent to the reel.

The cord reel will be mounted above the pump enclosure on the officer side.

The circuit breaker used to protect any device attached to the cord reel will be sized to the smallest electrical connection used.

## ELECTRIC CABLE

Two hundred (200) feet of Type SO yellow 10/3 heavy duty electric cable will be provided on the reel.

One (1) NEMA L5-15R, 15 amp, three prong twist-lock receptacle will be provided on the end of the cable.

## CABLE ROLLER ASSEMBLY

One (1) four (4) roller assembly(s) will be provided adjacent to each cord reel to provide un-obstructed deployment and rewinding of the cable.

One (1) cable ball stop(s) will be installed on the cable to keep the cable end from passing through the roller assembly.

## COMMAND LIGHT, KNIGHT-2 MODEL KL465 LIGHT TOWER

The apparatus will be equipped with an all electric floodlight tower. The unit will not require tapping into vehicle braking system to be operated, eliminating the chance for vehicle brake problems. Hydraulic or pneumatic type floodlights are not acceptable alternatives to the all electric light tower specified.

The light tower will extend 87-1/2" above the mounting surface and will extend to full upright position in less than 15 seconds. The overall size of nested light tower will be approximately 23" wide x 47" long x 11-1/4" high and weigh approximately 136 pounds.

The Command Light assembly will be of aluminum construction, with stainless steel shafts and bronze bushings for long life and low maintenance.

The electrically controlled unit will not require usage of the vehicle's air supply for operation, thereby eliminating the chance for air leaks in the vehicle braking system. Hydraulic or pneumatic type floodlights are not acceptable alternatives to the specified all electric light tower.

The light tower will be a two-stage articulating device with a lighting bank on top of the second stage capable of continuous 360 degree rotation. The light will be elevated by electric linear actuators, one (1) actuator will elevate the light bank and one (1) actuator will adjust the light bank angle from 0 to 110 degrees. Power for the light bank will be supplied through power collecting rings thus allowing continuous 360 degree rotation in either direction.

The tower base will have a light that illuminates the envelope of motion during any movement of the light tower mast.

The light tower will be capable of overhanging the side or back of the vehicle to provide maximum illumination to the vicinity adjacent to the vehicle.

The light tower will be controlled with a hand-held 15 foot umbilical line remote control. The storage station for the remote control unit will be equipped with a button to activate the "Auto-Park" automatic nesting feature.

The controls on the remote box will be:

- Three (3) switches, one (1) for each light bank.
- One (1) light bank rotation switch.
- One (1) switch for elevating lower and upper stage.
- One (1) indicator light to indicate when light bank is out of roof nest position.
- One (1) indicator light to indicate when light bank is rotated to proper nest position.

The Command Light will be equipped with the following bank of floodlights:

- Number of lamp heads: Six (6)
- Voltage: 120 volt
- Watts of each lamp head: 650 watts
- Total watts of light tower: 3900 watts

The light heads will be mounted in three (3) on each side of the light tower, giving two (2) vertical lines of three (3) when the lights are in the upright position.

The six (6) 650-watt light heads will require one (1) 120-volt, two pole 15-amp circuit breaker.

**COMMAND LIGHT - BACK LIGHTING**

The specified Command Light light tower will be equipped with the back light option. This will allow the bottom bank of lights to be rotated independently of the other light banks.

The light tower will be mounted at the front of the hose bed.

**LADDER STORAGE**

The ground ladders will be stored vertically next to the water tank, behind the side body compartments, on the officer side of the apparatus.

**LADDER SCUFFPLATE**

The ladder access door will have an aluminum diamond plate panel on the inner surface of the door.

**LADDERS**

The following Duo-Safety ground ladder compliment will be provided:

- One (1) Duo-Safety series 900-A, 24', aluminum, two (2) section extension ladder will be provided.
- One (1) Duo-Safety series 775-A, 14', aluminum, straight roof ladder with folding hooks will be provided.
- One (1) Duo-Safety series 585-A, 10', folding, aluminum, attic ladder will be provided.
- One (1) Little Giant model 17 ladder system with mounting hardware will be provided. This ladder has an extension height ranging from 9'-0" to 15'-0"

****** PIKE POLES AND HOLDERS ******

**PIKE POLE STORAGE**

Four (4) pike pole tube(s) will be provided. Each holder will be equipped with a spring type holder and will be accessible from the rear of the apparatus. Each pike pole holder will be labeled to indicate the pike pole length.

The pike pole tube(s) will be mounted in the ladder storage compartment.

**SUCTION HOSE STORAGE**

The suction hoses will be located beneath the hose bed, one (1) on the driver side and one (1) on the officer side. The hose storage area will be accessed from the rear of the apparatus. The storage area will be enclosed with a hinged door on the rear of the body.

Note: On bodies with rollup style doors this storage area will be behind the roll of the door and will not affect usable compartment space. On bodies with hinged style doors this storage area will be in the top corner of the compartment.

**SUCTION HOSE**

Two (2) 10 foot sections of six (6) inch PVC lightweight suction hose will be furnished (Kochek or Firequip Maxi-Flex). Suction hose will be for suction only and not to be used on pressurized hydrants or for relay pumping. Couplings will include a long handle, female swivel on one end and a rocker lug male on the other end. All threads will be six (6) inch N.S.T.

NOTE: All PVC suction hoses are strictly drafting hoses and must not be used on hydrants or in pressure applications, as serious personal injury or death may occur.

**STRAINER**

One (1) 6" NST barrel type strainer(s) will be provided to attach to the suction hose. A compartment mounting bracket will also be provided to store the strainer(s) when not in use.

**HYDRANT ADAPTER**

A double female swivel hydrant adapter will be provided along with a screw base mounting bracket. One end will attach to the suction hose and the other end to be 4-1/2" N.S.T. thread.

**ADDITIONAL ITEMS SUPPLIED WITH THE VEHICLE**

- 1 - Pint of touch up paint for each color
- 1 -Bag of assorted stainless steel nuts and bolts

**LOOSE EQUIPMENT**

The following items will be provided and shipped loose with the completed apparatus at the time of delivery:

- One (1) Amerex 2 1/2 gallon pressurized water extinguisher(s) w/bracket
- One (1) Amerex 20 pound ABC dry chemical extinguisher(s) w/bracket

**WHEEL CHOCKS**

Two (2) ZICO #SAC-44 folding wheel chocks will be mounted forward of the rear wheels on the driver side below the side running board compartments.

****** PAINT SECTION ******

**PAINT, PREPARATION AND FINISH**

The PPG Delta, Low V.O.C., polyurethane finishing system, or equal, will be utilized. A "Clear Coat" paint finish will be supplied to provide greater protection to the quality of the exterior paint finish.

All removable items, such as brackets, compartment doors, etc. will be painted separately to insure finish paint behind mounted items. All compartment unwelded seams exposed to high moisture environments will be sealed using permanent pliable caulking prior to finish paint.

**BODY PRIMER & PREPARATION**

All exposed welds will be ground smooth for final finishing of areas to be painted. The compartments and doors are totally degreased and phosphatized. After final body work is completed, grinding (36 and 80 grit), and finish sanding will be used in preparation for priming.

**BODY FINISH PAINT**

The body will be finish sanded and prepared for final paint. Upon completion of final preparation, the body will be painted utilizing the highest quality, state of the art, low V.O.C., polyurethane base paint. Finish paint will be applied in multiple coats to ensure proper paint coverage with a high gloss finish.

The entire body will be buffed and detailed.

**BODY PAINT**

The inside and underside of the complete body assembly will be painted job color prior to installation of the body on the chassis or torque box. The body paint finish will be PPG Delta System in a single color, to match customer furnished paint codes and requirements.

**COMPARTMENT PAINT**

The interior of the compartments will be finish painted with Zolatone #20-63 Marble Stone scuff resistant paint to provide a protective application over all of the compartment interior surfaces.

**BODY PAINT**

The body paint finish will be PPG Delta System in a single color, to match customer furnished paint codes and requirements.

**PUMP / PIPING PAINT**

The pump enclosure and pump/plumbing within the pump enclosure will be painted black.

**CAB PRIMER & PREPARATION**

The cab primer will be a two (2) stage process. First stage will be a coating with a two part component, self etching, corrosion resistant primer to chemically bond the surface of the metal for increased adhesion. Second stage will be multiple coats of a catalyzed, two component polyurethane, primer applied for leveling of small imperfections and top coat sealing.

**CAB FINISH PAINT**

The entire cab will be finish sanded and prepared for final paint. Upon completion of final preparation, the cab will be painted utilizing the highest quality, state of the art, low V.O.C., polyurethane base paint. Finish paint will be applied in multiple coats to ensure proper paint coverage with a high gloss finish.

The cab exterior will be painted with PPG Delta system to match purchaser's furnished paint codes. A two-tone paint finish will be provided with the two-tone break line located approximately 3" below the cab side windows.

The entire exterior finish of the cab will be buffed and detailed.

**CAB INTERIOR PAINT**

The interior metal surfaces of the cab will be finish painted with Zolatone #20-64 grey stone paint.

**CHASSIS PAINT**

The chassis frame rails, running gear, pump and plumbing will be painted with Polyurethane paint to match the body color code prior to the installation of any air lines or electrical system to ensure serviceability.

**WHEEL PAINT**

The chassis wheels and hubs will be provided as painted by the original wheel and axle manufacturers.

**PAINT CODES**

The paint will match customer furnished paint code(s) and layout. The paint code(s) will be as indicated below:

- **PRIMARY PAINT COLOR**

  *Single Color:* *TBD* *Paint Code#* *TBD*

- **SECONDARY PAINT COLOR**

  *Two/Tone Color:* *TBD* *Paint code#* *TBD*

**TOUCH-UP PAINT**

One (1) pint of each exterior color paint for touch-up purposes will be supplied when the apparatus is delivered to the end user.

**FINALIZATION & DETAILING**

Prior to delivery the vehicle, the interior and exterior be cleaned and detailed. The finalization process detailing will include installation of NFPA required labels, checking fluid levels, sealing and caulking required areas of the cab and body, rust proofing, paint touch-up, etc.

**RUST PROOFING**

The entire unit will be thoroughly rust proofed utilizing rustproof and sound deadening materials applied in manufacturer recommended application procedures. Rust proofing will be applied during the assembly process and upon completion to insure proper coverage in all critical areas.

****** LETTERING AND STRIPING ******

**COMPUTER GENERATED LETTERING**

The lettering and striping will be custom designed utilizing state of the art computer software and computerized cutting machines. The manufacturer will employ a full time artist / designer to generate all lettering, decals, and striping to meet the requirements of the Fire Department. The artwork for the lettering and striping will be kept on record by the apparatus manufacturer to allow for ease in duplication for the Fire Department.

**LETTERING FONT**

The lettering will be designed and cut with a basic block type font:

"BLOCK TYPE FONT"

****** NFPA REQUIRED SCOTCH-LITE STRIPING ******

**SCOTCH-LITE STRIPE**

A four (4) inch high "Scotch-Lite" stripe will be provided. The stripe will be applied on a minimum of 60 percent of each side of the unit, 60 percent on the rear of the unit and 40 percent on the front of the unit. The Scotch-Lite stripe layout will be determined by the Fire Department.

The Scotch-Lite will be white in color.

**REAR CHEVRON STRIPING**

At least 50% of the rear facing vertical surface will be covered with alternating strips of reflective striping.

The striping will be 6" Scotch-Lite.

The Scotch-Lite will be Ruby Red #680-82 and Lemon Yellow #680-81 in color.

******* WARRANTIES & REQUIRED INFORMATION *******

**VEHICLE WARRANTY**

The proposed vehicle includes a two (2) year new vehicle warranty, upon delivery and acceptance of the vehicle. The warranty will ensure that the vehicle has been manufactured to the proposed contract specifications and will be free from defects in material and workmanship that may appear under normal use and service within the warranty period. The warranty may be subject to different time and mileage limitations for specific components and parts. This warranty is issued to the original purchaser of the vehicle.

The warranty will not apply to tires, batteries, or other parts or components that are warranted directly by their manufacturers. The warranty will not apply to routine maintenance requirements as described in the service and operators manual. No warranty whether express, implied, statutory or otherwise including, but not limited to any warranty of merchantability or fitness for purpose will be imposed.

**OVERALL UNIT AND CUSTOM CHASSIS**

All components and parts of the vehicle are warranted for a period of two (2) years from acceptance of the vehicle, unless excluded elsewhere in this warranty or described as having longer time limitations.

**ENGINE WARRANTY**

The proposed unit will be equipped with a Fire Service rated engine, which will come furnished with a five (5) year Engine Manufacturer's warranty. A copy of the manufacturer's warranty will be supplied to define additional details of the warranty provisions.

**TRANSMISSION WARRANTY**

The proposed Allison transmission will be provided with a five (5) year warranty. A copy of the Allison transmission warranty will be supplied to the purchaser to define additional details of the warranty provisions.

**CUSTOM CHASSIS FRAME RAILS**

The proposed KME custom chassis frame and cross members will be warranted for an unlimited time period. A copy of KME's frame rail warranty will be supplied to define additional details of the warranty provisions.

**SHEPPARD STEERING UNIT**

The proposed Sheppard steering gear will be warranted for a period of one(1) year from the first date of service or 100,000 miles (160,000 kilometers), whichever occurs first. The product will be free from defects in material and workmanship under normal use in applications approved in advance by Sheppard.

**MERITOR FRONT AXLE WARRANTY**

The Meritor axle will be provided with a two (2) year parts and labor warranty. The wheel seals, gaskets and wheel bearings will have a one (1) year warranty. A copy of Meritor's warranty will be supplied to define additional details of the warranty provisions.

**MERITOR REAR AXLE WARRANTY**

The Meritor axle will be provided with a two (2) year parts and labor warranty. The wheel seals, gaskets and wheel bearings will have a one (1) year warranty. A copy of Meritor's warranty will be supplied to define additional details of the warranty provisions.

**CAB STRUCTURE WARRANTY**

The proposed cab will be warranted against structural defects for a period of ten (10) years from the date of acceptance of the unit. Details of warranty coverage, limitations and exclusions are included in the specific warranty document.

**BODY STRUCTURE WARRANTY**

The proposed body will be warranted against structural defects for a period of ten (10) years from the date of acceptance of the unit. Details of warranty coverage, limitations and exclusions are included in the specific warranty document.

**CORROSION WARRANTY**

The proposed cab and body will be warranted against rust-through or perforation, due to corrosion from within, for a period of ten (10) years. Perforation is defined as a condition in which an actual hole occurs in a sheet metal panel due to rust or corrosion from within. Surface rust or corrosion caused by chips or scratches in the paint is not covered by this warranty.

**PAINT FINISH WARRANTY**

The proposed paint finish will be warranted for a period of ten (10) years from the date of acceptance of the unit. Details of warranty coverage, limitations and exclusions are included in the specific warranty document.

**5 YEAR LETTERING WARRANTY**

Kovatch Mobile Equipment Corporation shall provide a five (5) year warranty against defects in material and workmanship for all graphic processes. Any valid claims must be made in writing with in 15 days of the determination of any defects to KME Fire Apparatus. KME Fire Apparatus will at its option make any necessary repairs either at a local authorized service center or at the factory, if required. KME Fire Apparatus will make the final decision as to where the
repairs are to be made and any transportation cost are the owners responsibility, KME will at its option repair or replace any verified defects in workmanship or materials at no cost to the owner provided all the requirements of this warranty have been met.

KME shall not be liable to the original purchaser or anyone else for consequential, incidental, special or direct damages, including, but mot limited to, any claims for loss of profits, down time, loss of use or inconvenience. THE COMPANY MAKES NO OTHER WARRANTY, EXPRESSED OF IMPLIED, AND SPECIFICALLY, DISCLAIMS ANY IMPLIED WARRANTY INCLUDING THE WARRANTY OF MERCHANTABILITY.

KME continually strives to improve its products and therefore, reserves the right to make improvements or changes without incurring any obligations to make such changes or additions on equipment previously sold.

GSO#_____
VIN# _____

**STAINLESS STEEL PLUMBING WARRANTY**

The proposed stainless steel plumbing will be warranted for a period of ten (10) years from the date of acceptance of the unit. Details of warranty coverage, limitations and exclusions are included in the specific warranty document.

**REAR SUSPENSION - HENDRICKSON - 1 YEAR WARRANTY**

Hendrickson warrants suspension products manufactured by it to be free from defects in material and workmanship which occur under normal use and service for a period of one(1) year.

This warranty will not apply and no warranty of any kind will exist as to any product which has been subject to abuse, misuse, neglect, misapplication or accident of any type or cause or which has been repaired, replaced, substituted or used with parts other than genuine Hendrickson parts or altered by anyone.

**WATER TANK (LIFETIME)**

The proposed water tank will be warranted by the water tank manufacturer for the "Lifetime" of the unit. A copy of the manufacturer's warranty will be supplied to define additional details of the warranty provisions.

**HALE FIRE PUMP LIMITED STANDARD WARRANTY**

Hale Products, Incorporated ("Hale") hereby warrants to the original buyer that products manufactured by Hale will be free of defects in material and workmanship for a period of five (5) years from the date product is first placed into service or five and one-half (5 1/2) years from date of shipment by Hale, whichever period will be first to expire. Within this warranty period Hale will cover parts and labor for the first two (2) years and parts only for years three (3) through five (5).

**10 YEAR WARRANTY – AKRON HEAVY DUTY VALVES**

Akron Brass warrants Heavy Duty Swing-Out Valves for a period of ten (10) years after purchase against defects in material or workmanship. Akron Brass will repair or replace any Heavy Duty Swing Out Valve which fails to satisfy this warranty.

**BOSTROM SEATING WARRANTY 5 YEAR**

HO Bostrom will warrant each new seat manufactured, to be free from defects in materials and workmanship when delivered to the original purchaser for a period of five (5) years.

Labor to remove or reinstall and transportation of defective items will not be covered by, or any allowance made for said cost under this warranty.

**WARRANTY LOCATION**

All possible warranty work shall be performed at the buyer's fire station when possible. If the apparatus must return to the service center then the successful bidder shall supply drivers to transport the vehicle to and from at no additional charge to the Fire District.

**TOOL MOUNTING, LETTERING AND STRIPING ALLOWANCE**

An allowance of $9,000 for lettering, striping and mounting of hand tools is included with this proposal.

## OPTIONS - NOT INCLUDED IN TOTAL

**1. DUAL TANK TO PUMP LINES: $2,300.00.**
**DUAL TANK TO PUMP**

Two (2) 3" full flow tank to pump lines will be piped through the front bulkhead of the tank with a 90 degree elbow down into two (2) individual sumps located one (1) at front and one (1) at the rear of the tank. These lines will be plumbed directly into the rear of the pump suction manifold for maximum efficiency.

Each tank outlet will be equipped with an in-line check valve to prevent accidental pressurization of the water tank through these plumbing lines. Connection from the valves to the tank will be made using non collapsible flexible rubber hoses.

The sumps will be located with one (1) at the front of the tank and one (1) located at the rear of the tank for pumping on a grade for maximum water utilization.

Each tank to pump connection will be equipped with a 3" Akron # 8800 series full flow, stainless steel ball valve between the pump suction manifold and the water tank outlets.

Each tank to pump valve will be equipped with a separate push/pull control handle which will be located on the operator's panel with function plate.

**TANK SUMP CONNECTION**

The front bulkhead of the water tank will be fitted with one (1) front and one (1) rear.

**2. BOOSTER REEL: $3,400.00.**
**BOOSTER REEL #1 DISCHARGE**

A 1 1/2" booster reel discharge will be plumbed from the pump to the booster reel.

The booster reel discharge will be plumbed from the valve to the hose reel utilizing 1" high pressure hose. The end of the hose connected to the hose reel will be equipped with a swivel end for ease in hose replacement.

A 1 1/2" Akron, #8800 series, full flow, stainless steel ball valve will be provided for the booster reel #1 discharge. The valve will be equipped with the Akron "Tork-Lok" feature.

The booster reel discharge valve will be controlled by a push/pull handle located on the operator's panel.

The booster reel discharge will be equipped with a 2 ½" diameter Noshok pressure gauge. The gauge will have a rugged corrosion free stainless steel case and clear scratch resistant molded crystals with captive O-ring seals to ensure distortion free viewing and seal the gauge. The gauge will be filled with a synthetic mixture to dampen shock and vibration, lubricate the internal mechanisms, prevent lens condensation and ensure proper operation from –40℉ to +160℉.

The gauge will exceed ANSI B40.1 Grade A requirements with an accuracy of +/- 1.5% full scale and include a size appropriate phosphorous bronze bourdon tube with a reinforced lap joint and large tube base to increase the tube life and gauge accuracy.

A polished chrome-plated stainless steel bezel will be provided to prevent corrosion and protect the lens and gauge case. The gauge will have black graphics on a white background.

**BOOSTER REEL #1**

One (1) painted steel electric rewind booster reel will be furnished. The reel will be equipped with a water lubricated; self flushing, bronze swivel joint and an adjustable brake for freewheeling, drag or full lock operation.

The booster reel #1 will be mounted in a body compartment as directed by the fire department.

Booster reel rewind will be controlled by a push button near the reel. The booster reel circuit will be equipped with a shielded toggle switch to act as a booster reel disconnect to avoid accidental actuation of the booster reel rewind button.

Each booster reel will be equipped with 200' of 1" booster hose in 100' sections. Each length will be fitted with NST couplings.

**3. DIRECT TANK FILL: $950.00.**
**DIRECT TANK FILL - DRIVER SIDE**

One (1) 2-1/2" NST direct tank fill will be provided at the rear of the body, on the driver side, as low as possible. The direct tank fill will be gated with a 2-1/2" Akron ball valve with a swing handle. The fill will be equipped with a 30 degree elbow terminating with a 2-1/2" NST female swivel connection. A quarter turn drain valve will be supplied to bleed off excess pressure with a drain hose routed beneath the rear step area.

**NFPA REQUIRED LOOSE EQUIPMENT, PROVIDED BY FIRE DEPARTMENT**

The following loose equipment as outlined in NFPA 1901, 2009 edition in accordance with the applicable requirements, will be provided by the fire department. All loose equipment will be installed on the apparatus before placed in emergency service, unless the fire department waives NFPA section 4.21.

Section 5.7 Equipment.

It is the responsibility of the purchaser to ensure that all required equipment has been supplied and installed on the apparatus in order to achieve compliance with the standard prior to placing it in service.

5.7.1 Ground Ladders.

5.7.1.1 All fire department ground ladders carried on the apparatus shall meet the requirements of NFPA 1931, Standard for Manufacturer's Design of Fire Department Ground Ladders, except as permitted by 5.7.1.3 and 5.7.1.4.

5.7.1.2 At a minimum, the following fire department ground ladders shall be carried on the apparatus:

(1) One straight ladder equipped with roof hooks
(2) One extension ladder
(3) One folding ladder

5.7.1.3 Stepladders and other types of multipurpose ladders meeting ANSI AI4.2, Ladders - Portable Metal- Safety Requirements, or ANSI A14.5, Ladders - Portable Reinforced Plastic Safely Requirements, with duty ratings of Type IA or lAA shall be permitted to be substituted for the folding ladder required in 5.7.1.2(3).

5.7.1.4 Stepladders and other types of multipurpose ladders shall be permitted to be carried in addition to the minimum fire department ground ladders specified in 5.7.1.2 provided they meet either ANSI AI4.2 or ANSI A14.5 with duty ratings of Type 1A or 1AA.

Section 5.7.2 Suction Hose or Supply Hose.

It is the responsibility of the purchaser to ensure that all required equipment has been supplied and installed on the apparatus in order to achieve compliance with the standard prior to placing it in service.

5.7.2.1 A minimum of 20 ft (6 m) of suction hose or 15 ft (4.5 m) of supply hose shall be carried.
5.7.2.1.1 Where suction hose is provided, a suction strainer shall be furnished.
5.7.2.1.2 Where suction hose is provided, the friction and entrance loss of the combination suction hose and strainer shall not exceed the losses listed in Table 16.2.4.1 (b) or Table 16.2.4.1(c).
5.7.2.1.3 Where supply hose is provided. It shall have couplings compatible with the local hydrant outlet connection on one end and the pump intake connection on the other end.
5.7.2.2 Suction hose and supply hose shall meet the requirements of NFPA 1961, Standard on Fire Hose.

Section 5.8 Minor Equipment.

It is the responsibility of the purchaser to ensure that all required equipment has been supplied and installed on the apparatus in order to achieve compliance with the standard prior to placing it in service.

5.8.2 Fire Hose and Nozzles. The following fire hose and nozzles shall be carried on the apparatus:
(1) 800 ft (240 m) of 2 1/2 in. (65 mm) or larger fire hose
(2) 400 ft (120 m) of 1 1/2 in. (38 mm), 1 3/4 in. (45 mm), or 2 in. (52 mm) fire hose
(3) One handline nozzle. 200 gpm (750 L/min) minimum
(4) Two handline nozzles. 95 gpm (360 L/min) minimum
(5) One playpipe with shutoff and 1 in. (25 mm), 1 1/8 in. (29 mm), and l 1/4 in. (32 mm) tips

5.8.3 Miscellaneous Equipment. The following additional equipment shall be carried on the apparatus:
(1) One 6 lb (2.7 kg) flathead axe mounted in a bracket fastened to the apparatus
(2) One 6 lb (2.7 kg) pickhead axe mounted in a bracket fastened to the apparatus
(3) One 6 ft (2 m) pike pole or plaster hook mounted in a bracket fastened to the apparatus
(4) One 8 ft (2.4 m) or longer pike pole mounted in a bracket fastened to the apparatus
(5) Two portable hand lights mounted in brackets fastened to the apparatus
(6) One approved dry chemical portable fire extinguisher with a minimum 80-B:C rating mounted in a bracket fastened to the apparatus
(7) One 2 1/2 gal (9.5 L) or larger water extinguisher mounted in a bracket fastened to the apparatus
(8) One self-contained breathing apparatus (SCBA) complying with NFPA 1981, Standard on Open-Circuit Self Contained Breathing Apparatus (SCBA) for Emergency Services, for each assigned sealing position. But not fewer than four, mounted in brackets fastened to the apparatus or stored in containers supplied by the SCBA manufacturer
(9) One spare SCBA cylinder for each SCBA carried, each mounted in a bracket fastened to the apparatus or stored in a specially designed storage space
(10) One first aid kit
(11) Four combination spanner wrenches mounted in brackets fastened to the apparatus
(12) Two hydrant wrenches mounted in brackets fastened to the apparatus
(13) One double female 2 1/2 in. (65 mm) adapter with National Hose (NH) threads, mounted in a bracket fastened to the apparatus
(14) One double male 2 1/2 in. (65 mm) adapter with NH threads, mounted in a bracket fastened to the apparatus
(15) One rubber mallet, suitable for use on suction hose connections, mounted in a bracket fastened to the apparatus
(16) Two salvage covers each a minimum size of 12 ft x 14 ft (3.7 m x 4.3 m)
(17) Two or more wheel chocks. Mounted in readily accessible locations, that together will hold the apparatus. When loaded to its GVWR or GCWR, on a hard surface with a 20 percent grade with the transmission in neutral and the parking brake released

(18) One traffic vest for each seating position, each vest to comply with ANSI/ISEA 207, Standard for High-Visibility Public Safety Vests, and have a five-point breakaway feature that includes two at the shoulders, two at the sides, and one at the front
(19) Five fluorescent. orange traffic cones not less than 28 in. (711 mm) in height, each equipped with a 6 in. (152 mm) retroflective white band no more than 4 in. (102 111m) from the top of the cone, and an additional 4 in. (102 mm) retroflective white band 2 in. (51 mm) below the 6 in. (152 mm) hand
(20) Five illuminated warning devices such as highway flares, unless the live fluorescent orange traffic cones have illuminating capabilities
(21) One automatic external defibrillator (AED)

5.8.3.1 If the supply hose carried does not use sexless couplings, an additional double female adapter and double male adapter, sized to fit the supply hose carried, shall be carried mounted in brackets fastened to the apparatus.
5.8.3.2 If none of the Pump intakes are valved, a hose appliance that is equipped with one or more gated intakes with female swivel connection(s) compatible with the supply hose used on one side and a swivel connection with pump intake threads on the other side shall be carried. Any intake connection larger than 3 in. (75 mm) shall include a pressure relief device that meets the requirements of 16.6.6.
5.8.3.3 If the pumper is equipped with an aerial device with a permanently mounted ladder, four ladder belts meeting the requirements of NFPA 1983, Standard on Life Safety Rope and Equipment for Emergency Services shall be provided.
5.8.3.4 If the apparatus does not have a 2 1/2 in. intake with NH threads, an adapter from 2 1/2 in. NH female to a pump intake shall be carried, mounted in a bracket fastened to the apparatus if not already mounted directly to the intake.
5.8.3.5 If the supply hose carried has other than 2 1/2 in. NH threads, adapters shall be carried to allow feeding the supply hose from a 2 1/2 in. NH thread male discharge and to allow the hose to connect to a 2 1/2 in. NH female intake, mounted in brackets fastened to the apparatus if not already mounted directly to the discharge or intake.

14.1.8.4 Fire Helmet.

It is the responsibility of the purchaser to ensure that "Fire helmets shall not be worn by persons riding in enclosed driving and crew areas any time the apparatus in placed in service.

14.1.8.4.1 A location for helmet storage shall be provided.
14.1.8.4.2 If helmets are to be stored in the driving or crew compartment, the helmets shall be secured in compliance with 14.1.11.2.

14.1.10 SCBA Mounting.

It is the responsibility of the purchaser to ensure that any SCBA equipment has been supplied and installed on the apparatus in order to achieve compliance with the standard prior to placing it in service.

14.1.10.1 Where SCBA units are mounted within a driving or crew compartment, a positive latching mechanical means of holding the SCBA device in its stowed position shall he provided such that the SCBA unit cannot be retained in the mount unless the positive latch is engaged.
14.1.10.2 The bracket holding device and its mounting shall retain the SCBA unit when subjected to a 9 G force and shall be installed in accordance with the bracket manufacturer's requirements.
14.1.10.3 If the SCBA unit is mounted in a seatback, the release mechanism shall be accessible to the user while seated.

14.1.11 Equipment Mounting.

It is the responsibility of the purchaser to ensure that any equipment installed on the apparatus by them or their subcontractor meets the following requirements prior to placing it in service.

14.1.11.1 All equipment required to be used during an emergency response shall be securely fastened.

14.1.11.2 All equipment not required to be used during an emergency response, with the exception of SCBA units, shall not be mounted in a driving or crew area unless it is contained in a fully enclosed and latched compartment capable of containing the contents when a 9 G force is applied in the longitudinal axis of the vehicle or a 9G force is applied in any other direction, or the equipment is mounted in a bracket(s) that can contain the equipment when the equipment is subjected to those same forces.

Section 15.9.3 Reflective Striping.

It is the responsibility of the purchaser to ensure that Reflective Striping has been supplied and installed on the apparatus in order to achieve compliance with the standard prior to placing it in service.

15.9.3.1"' A retroreflective stripe(s) shall be affixed to at least 50 percent of the cab and body length on each side, excluding the pump panel areas, and at least 25 percent of the width of the front of the apparatus.

15.9.3.1.1 The stripe or combination of stripes shall be a minimum of 4 in. (100 mm) in total width.

15.9.3.1.2 The 4 in. (100 mm) wide stripe or combination of stripes shall be permitted to be interrupted by objects (i.e., receptacles, cracks between slats in roll up doors) provided the full stripe is seen as conspicuous when approaching the apparatus.

15.10 Hose Storage.

It is the responsibility of the purchaser to ensure that any hose storage area includes a positive means to prevent unintentional deployment in order to achieve compliance with the standard prior to placing it in service.

15.10.7 Any hose storage area shall be equipped with a positive means to prevent unintentional deployment of the hose from the top, sides, front, and rear of the hose storage area while the apparatus is underway in normal operations.